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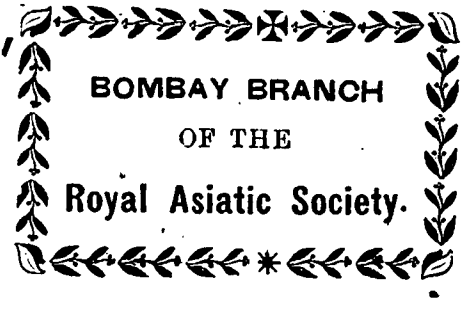

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THE

BRITISH SPECIES

OF

ANGIOCARPOUS LICHENS,

ELUCIDATED BY

THEIR SPORIDIA.

88279

BY THE

REV. W. A. LEIGHTON, B.A.

F.B.S. E. & L.

LONDON:

PRINTED FOR THE RAY SOCIETY.

MDCCCLI.

"Think of the beauty which God has spread abroad for our use; its profuseness, in desert spots where none can see it; its minuteness, so that much can only be discovered by a microscope; and its extent, embracing all things."

SEWELL'S *Margaret Percival*, 2, 435.

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C. AND J. ADLARD, PRINTERS, BARTHOLOMEW CLOSE.

TO

WILLIAM BORRER, ESQ., F.R.S. L.S., &c.

This Work

IS GRATEFULLY AND RESPECTFULLY DEDICATED BY

THE AUTHOR.

LUCIEFELDE, SHREWSBURY,
Jan. 1, 1851.

THE Members of the Ray Society are respectfully solicited to aid the author of this work in his endeavours to clear up some doubtful points, by communicating for examination specimens of the following Lichens. Such specimens as may be transmitted to him, addressed Rev. W. A. Leighton, Luciefelde, Shrewsbury, shall be taken care of, and speedily and safely returned with thanks.

Endocarpon lætevirens, *Turn.*
— sulphureum, *Tayl.*
— rugosum, *Tayl.*
Parmelia badia, *Fries.*
— cervina, *Fries.*
Verrucaria byssacea, *Tayl.*
— alba, *Schrad.*
— muralis, *Ach.*
— rubiginosa, *Tayl.*
— rupestris, *Schrad.*
— Gagei, *Borr.*
— Harrimanni, *Ach.*

The author has entered upon a similar investigation in the genera Umbilicaria, Opegrapha, Graphis, Lecanactis, Platygramme, Arthonia, Spiloma, Calicium, and Collema, specimens, even of the commonest species, will therefore be useful and acceptable.

THE

BRITISH SPECIES

OF

ANGIOCARPOUS LICHENS.

INTRODUCTION.

Every botanist is fully aware how valuable and available a character is afforded by the form and external markings of the seeds in very many species of Phænogamous plants; the correct determination of the species frequently depending exclusively thereupon. Analogous reasoning leads us to the conclusion, that the form and septa of the sporidia in Cryptogamic plants would present similarly useful characters. Investigation proves the correctness of this conclusion. Owing, however, to the minuteness of the parts, the delicacy and care required in the manipulation, and the employment of high magnifying powers, these organs, in the family of the Lichens at least, do not seem to have hitherto received that attention which their importance really demands. This field of research, fertile though it actually is, may therefore be said to be comparatively a new and untrodden one, more especially as regards British Lichens. Lichenists have been, indeed, long aware of the existence and general conformation of these particular organs, but it is believed have never applied them to characterise or determine species.

Acharius, in his 'Lichenographia Universalis' (1810), frequently mentions the asci and sporidia under the names of cellulæ and vesiculæ, but neither searches into

nor describes their form and number, so as to render them available in the discrimination of genera or species.* They were also previously known to Hedwig, (see his Theoria, p. 206, 1798,) in tab. xxxiii., figs. 3, 4, 5, 6, of which work he figures the sporidia of three different Lichens; and still earlier to Dillenius (Hist. Musc., 1741, p. 75,) and Micheli, (Nova. Plant. Genera, 1729, p. 73, & tab. xxxvi., lii.) The only writers, however, who have devoted anything like attention to the subject are Eschweiler and Fée. Eschweiler, in his 'Syst. Lichenum,' (Norimb., 1824, 4to,) has one plate in which he figures the sporidia of the genera of crustaceous Lichens, and mentions also their forms in his generic characters; and in his labours in the splendid 'Icones Plant. Crypt. Brasil.,' by Martius, (Monachii, 1828, fol.) he figures the sporidia genus by genus, but according to Fée incorrectly. Fée, in his 'Essai sur les Cryptogames des Ecorces Officinales,' (pt. ii, 1837,) has five 4to plates filled with minute figures of sporidia, and applies them to the distinction and confirmation of the characters of the genera into which he proposes to arrange Lichens. His labours being limited to the Lichens found on the barks of foreign trees used for medicinal purposes, necessarily include but very few of our British species. It is believed that the present is the first work which has been hitherto devoted to the examination of the sporidia of British Lichens.

To make the forms of the sporidia characteristic of genera, except in a very few instances, would, it is conceived, lead to an almost endless subdivision, if fully carried out. Their real value rather seems to be as a distinguishing and confirmatory specific character. And how truly valuable a character they afford in the accurate discrimination of species, the following pages and plates will repeatedly and abundantly testify; and also

* He also mentions the ultimate spores contained in the sporidia, under the term *Gongyli*.

not unfrequently to their use in correctly referring some species, hitherto arranged in other genera, to their proper genera, as well as in the detection of new or hitherto unnoticed species.

The investigation has been rendered comparatively easy through the unbounded liberality and kindness of that distinguished and experienced Lichenologist, William Borrer, Esq., F.R.S., of Henfield, Sussex, who communicated authentic specimens of most of the plants, and permitted the examination of the original specimens, figured and described in 'English Botany,' and its 'Supplement,' and also those of many of the new species of Verrucaria and Endocarpon, discovered and described by Dr. Taylor, in 'Flora Hibernica,' and received from that botanist himself. These were accompanied by valuable remarks and hints, for which the present writer feels deeply indebted.

The dissections were made under a large and powerful microscope of the best construction by Messrs. Powell and Lealand, opticians, of London.

The characters and arrangement of the genera adopted in the following pages have been translated, with some slight modifications, from Fries's 'Lichenographia Europæa,' as the latest published work on European Lichens.

The localities inserted are those only of the specimens which have been used in the preparation of this work.

ANGIOCARPI, *Fries.*

Apothecium closed, perforated by a pore, or irregularly dehiscing; nucleus included, subglobose, ascigerous.

In this order of Lichens the apothecium is more or less globose, resting upon or immersed in the thallus, either formed from the thallus itself, or distinct, and consisting of an outer covering or shell (*perithecium*), varying in colour, black, red, or pale, either entirely enveloping the nucleus, or dimidiate, and situate on the upper or exposed portion. This outer shell or perithecium is (probably in all cases, though not always distinguishable,) lined with a tunic or membrane, more or less tough and consistent, and either black, brown, or pale and nearly colourless, which completely encloses the nucleus. The *nucleus* is internally white, or slightly coloured brown, more or less transparent, gelatinous, consisting of hyaline tubes or filaments (*asci*) of various forms, each ascus containing 8 *sporidia*, varying in shape and size in different species. Intermixed with the asci are generally *paraphyses*, usually considered as abortive asci. When mature, the sporidia escape from the ruptured asci through the pore or perforation at the apex of the perithecium.

Such appears to be the normal condition. In some plants, however, hitherto arranged under the genera of this order, (as *Verrucaria niveo-atra, rudis, aphanes, leucocephala*, and others,) there are no asci, the sporidia being innumerable and free, agglutinated into a mass, which dissolves as in many fungi. It may be questionable whether these should be ranked as Lichens correctly, or whether they should be regarded as fungi, either distinct or parasitic on the crusts of Lichens: but this must be decided by future and more favorable and extended observations.

Tribe I.—SPHÆROPHOREÆ, *Fries.*

Apothecium formed of the swollen extremities of the thallus, closed, at length irregularly lacerated and dehiscing. Nucleus subglobose, cleaving or separating with the asci. Thallus vertical, shrubby.

Genus 1.—Sphærophoron, *Ach.*

Apothecium terminal, sphærical, the thallodal receptacle closed, lacero-dehiscent. Nucleus globose, internally floccoso-cartilaginous, the discharged sporidia (black) crowded on the circumference. Thallus vertical, shrubby, externally crustaceo-cartilaginous, internally solid stupose.

Dr. Camille Montagne first ascertained the structure of the apothecium of the genus Sphærophoron. His observations are published in 'Ann. des Sc. Nat.' N.S. xv. 147, and an abridged extract therefrom appears in the 'Annals and Mag. Nat. Hist.' x. 267. He states that "the apothecium of Sphærophoron is at first only a simple ellipsoid swelling of the extremity of a branch. If at this period this be divided longitudinally, the cavity occupied by the nucleus is observed to have a sigmoid form. This is owing to a hemispherical projection of the medullary or central layer of the thallus, representing a sort of torus, from all points of which the sporidigerous tubes or thecæ diverge. Already is the upper part of the sporangium filled with that scobiform substance altogether different from the sporidia, and of a beautiful indigo-blue by transmitted light, but of an opaque black *en masse*, which finally tinges the thecæ and sporidia of a similar but less deep tint. The cavity gradually enlarges, not only from the swelling of the extremity of the branch, but also from the shrinking of the interior projection formed by the medullary layer of the thallus.

"The nucleus contained in the apothecium differs very slightly from that of other Lichens. It is composed of erect filaments pressed against each other, precisely as in the proligerous lamina of a *Lecidea*, and united by the intervention of a mucilaginous substance which greedily absorbs water. These tubular filaments, open at their free extremity, have exactly the form of the asci or utricules of a *Peziza*. They are linear, obtuse at the summit, and attenuated into a short pedicel at the base, which seems to be the continuation of the filaments of the medullary layer. In their young state they are perfectly transparent, and contain an opaline humour, in which at a later period appear hyaline globules, which are hence only visible on moving the diaphragm of the microscope. Gradually these filaments, which can be considered as no other than the true thecæ, assume a blueish tinge, which becomes more intense with age, but which, nevertheless, is never lost at any age, when the thecæ are viewed by transmitted light.

"The sporidia also become more and more apparent in the thecæ, being globose or oblong, and arranged in a single series. On the final rupturing of the theca they are set free, and become mingled with that mass of black powder, from which, however, they are clearly distinct, and whose origin it is very difficult to determine, because it exists in the very earliest period of the formation of the apothecium. The sporidium, either entirely spherical or slightly longer than broad, is bounded by a hyaline margin,* and coloured blue. These observations were made on a specimen of Sphærophoron coralloides collected in the Vosges."

To the above my own observations have added some few additional particulars. The medullary layer is composed of hyaline branched filaments, entangled into a woolly web or mass, (see Plate I., fig. 1, *a*,) surrounded by

* Montagne is scarcely correct in terming this a margin, properly speaking. It is, in fact, a hyaline *sac*, that appears like a margin under the microscope.

the cortical layer. The torus, which arises from the summit of the medullary layer and projects into the centre of the sporangium, is composed of roundish cells densely packed together, of a brown colour (fig. *c*). The scobiform substance appears to consist of the discharged sporidia massed together, from some of which the granular contents or ultimate spores have escaped, and become adherent to the surface of the perfect or unruptured ones. This granular substance may be removed by gently and carefully rubbing the mass between the glass plates of the compressorium under the microscope, when the sporidia, or rather their membranous coverings, appear underneath of a pale hyaline aspect (fig. *d*). The form of the sporidia may be clearly traced from those still contained in the asci, through those arrived at mature growth, in both of which states they appear of a beautiful indigo-blue colour (fig. *e*), to their aged state when the granular contents are discharged, altering their form by its adherence to their exterior, and rendering them in appearance rugged, black, and opaque. I have not ascertained that the asci are open at their free extremity as Montagne asserts to be the case, but they may be so in a mature stage of growth: those which I have observed are rounded at the extremity, and I believe closed, containing about 8 sporidia.

1. SPHÆROPHORON CORALLOIDES, *Turn.* and *Borr.* Apothecia erect, spherical; sporidia oblong. *Turn.* and *Borr.* Lich. Brit. 110, (1813.) *Hook.* Br. Fl., ii, 232.

a. LAXUM, *T.* and *B.* Thallus loose, irregularly divided. Plate I. fig. 1.

LICHEN GLOBIFERUS, *Linn.* Mant. 133. (1767.)
— — *Sm.* E. Bot. 115.
— — *Ach.* Prodr. 210.
SPHÆROPHORUS CORALLOIDES, *Pers.* in Ust. Ann. st 7. 23. (1794.)

SPHÆROPHORON CORALLOIDES, *Ach.* Meth. 134. (1803), Lich. Univ. 585. t. 12. f. 5.
— — *Fries*, L. Reform. 405.
SPHÆROPHORUS GLOBIFERUS, *D. C.* Fl. Fr. ed. 2. ii. 327. (1805).
SPHÆROPHORON CORALLOIDES, *α.* LAXUM, *Turn.* and *Borr.* Lich. Brit. 110. (1813).
— — *Hook.* Br. Fl. ii. 232.
— — *Tayl.* Fl. Hib. p. 2. 83.

β. CÆSPITOSUM, *T.* and *B.* Thallus cæspitose, fastigiate, dichotomous. Plate I. fig. 2.

LICHEN FRAGILIS, *Linn.* Sp. Pl. 1621. (1753.)
— — *Sm.* E. Bot. 2474.
SPHÆROPHORUS FRAGILIS, *Pers.* in Ust. Ann. st. 7. 23. (1794.)
LICHEN STERILIS, *Ach.* Prodr. 211. (1798.)
SPHÆROPHORON FRAGILE, *Ach.* Meth. 135. (1803); L. Univ. 585.
— — *Fries*, L. Reform. 405.
SPHÆROPHORUS CÆSPITOSUS, *D. C.* Fl. Fr. ed. 2. ii. 327. (1805.)
SPHÆROPHORON CORALLOIDES, *β.* CÆSPITOSUM, *Turn.* and *Borr.* Lich. Brit. 110. (1813.)
— — — *Hook.* Br. Fl. ii. 232.
— — *β.* FRAGILE, *Tayl.* Fl. Hib. p. 2. 83. (1836.)

α. Sussex sand-rocks! Scotland! *Mr. Borrer.* Shropshire, *Rev. T. Salwey.* Moors, Derbyshire! *Bohler's Lich. Brit.*

β. Scotland! *Mr. Borrer.* Charnwood Forest, Leicestershire (barren)! *Rev. A. Bloxam.* Craigforda, near Oswestry, Shropshire! *Rev. T. Salwey.* Stiperstones Hill, Shropshire!

In both these plants the *thallus* is of a brown colour, waxy in appearance, more or less compressed, though frequently only very slightly. The ultimate branches have an obtuse apex, being scarcely articulated or lobed. The *apothecia* are erect, spherical, with no perceptible difference in their shape. In *β. cæspitosum* the exterior has a wrinkled or sub-verrucose appearance, possibly

owing to the shrinking of the thallus, there being a greater space in the interior of the apothecium than in *a. laxum*. *Sporidia* 8 in each ascus, oblong, with a hyaline margin, of a bright and deep indigo-blue.

2. S. COMPRESSUM, *Ach.* Apothecia turned towards one side, flattened; sporidia round. Plate I. fig. 3.

LICHEN FRAGILIS, *Huds.* Fl. Angl. 558. (1798.)
— — *Sm.* E. Bot. 114.
— — *Ach.* Prod. 211.
SPHÆROPHORON COMPRESSUM, *Ach.* Meth. 135. (1803); L. Univ. 586. t. 12. f. 6.
— — *Turn.* and *Borr.* Lich. Brit. 115.
— — *Fries*, L. Reform. 404.
— — *Hook.* Br. Fl. ii. 232.

Sand-rocks near Tunbridge Wells! *Mr. Borrer.*

The *thallus* is pale, of a peculiar frosted, rigid, coralline aspect, compressed; the ultimate branches lobed or articulated, terminating in a rounded or oblong swollen apex, thus differing from *S. coralloides* and its variety.

The *apothecia* being turned towards one side and not erect affords a singular peculiarity, not to mention their depressed disk-like shape when old. *Sporidia* 8 in each ascus, round with a hyaline margin, black. I cannot satisfy myself as to the cause of the fibrillose appearance of the disciform nucleus, but believe it to arise from the asci becoming loosened one from another at their outer extremity. In this species the torus is single; in *coralloides* double.

Tribe II.—ENDOCARPEÆ, *Fries.*

Apothecium enclosed in the thallus, closed, perforated, with a distinct, regular, prominent ostiolum; receptacle entirely thallodal, or changed from the thallus. Nucleus deliquescent. Thallus horizontal, foliaceous, or crustaceous.

Genus 1.—Endocarpon, *Hedw.*

Apothecium imbedded in the thallus, globose; nucleus gelatinous, deliquescing; thallodal receptacle membranaceous, thin, pale; ostiolum prominent. Thallus horizontal, cartilaginous, foliaceous, subpeltate.

The structure of the thallus in all the species of this genus is similar. A vertical section exhibits the following arrangement of parts. The upper surface has a coloured cortical layer, externally darker, of squarish cells, (Plate I. fig. 4, *a*,) below which is a green layer (*b*), irregularly intermingled amongst an hexagonal or rounded-celled medullary layer (*c*), pale coloured, loose in texture in the upper portion, but denser towards the lower surface, which is bounded by the cortical layer of coloured square cells (*a*). In some species the thallus is fixed to the substance on which it grows by a central point or callus, from which it spreads on all sides in a peltate form and manner. In other species, the thallus is appressed to the soil, and nearly flat throughout its whole extent, adhering by woolly fibres issuing from the under surface. The apothecia (*d*) originate in the medullary layer, are at first deeply imbedded, and gradually in maturity rise to the upper surface. Their external covering or tunic (*e*) is pale coloured, tough, membranous, round, slightly elongated upwards into an obtuse beak or apex, which is surmounted by a dark brownish spot (*c*), perforated for the ultimate discharge of the sporidia. Nucleus (*f*) generally pale coloured, gelatinous, comprising asci containing sporidia (B).*

* Fée says that in Endocarpon, "les sporides sont disporés." I have represented them as they appeared to me.

** Thallus foliaceous, subpeltate.*

1. E. MINIATUM, *Ach.* α. UMBILICATUM, *Hook.* Sporidia 8 in asci,* elliptical, margined,† pale-coloured. Plate I. fig. 4.

LICHEN MINIATUS, *Linn.* Sp. Pl. 1617. (1762.)
— — *Ach.* Prod. 141.
— — *Sm.* E. Bot. 593. fig. sup.
ENDOCARPON MINIATUM, *α. Ach.* Meth. 127. (1803); L. Univ. 302; Syn. 101.
— — *Wahl.* Fl. Lapp. 462.
— — *Fries,* L. Ref. 408.
— — *Hook.* Br. Fl. ii. 156.
— — *Tayl.* Fl. Hib. p. ii. 98.

β. COMPLICATUM, *Hook.* Sporidia precisely similar. Plate II. fig. 1.

LICHEN COMPLICATUS, *Swartz,* Nova Act. Upsal. 4.
— — *Ach.* Prod. 142. (1798.)
LICHEN MINIATUS, *Sm.* E. Bot. 593, fig. inf. (1799.)
ENDOCARPON COMPLICATUM, *Ach.* Meth. 128. (1803); L. Univ. 303; Syn. 102.
— MINIATUM, *β. COMPLICATUM, Fries,* L. Ref. 408.
— — — — *Hook.* Br. Fl. ii. 156.
— — — *Tayl.* Fl. Hib. p. ii. 98.

α. St. Vincent's Rocks! *Mr. Borrer.* Craig-y-Rhiw, Oswestry, Shropshire! *Rev. T. Salwey.*

β. St. Vincent's Rocks! *Mr. Borrer.* Shropshire! *Rev. T. Salwey.*

* This phrase means that the sporidia are contained in asci, 8 in each ascus.

† There is no true margin, but the sporidium is a hyaline sac that appears like a margin under the microscope.

2. E. LEPTOPHYLLUM, *Ach.* Sporidia 8 in asci, elliptical, margined, pale-coloured. Plate II. fig. 2.

LICHEN LEPTOPHYLLUS, *Ach.* Prodr. 141. (1798.)
— — *Sm.* E. Bot. 2012. fig. 2.
ENDOCARPON LEPTOPHYLLUM, *Ach.* Meth. 127. (1803); L. Univ. 302.
— — *Hook.* Br. Fl. ii. 157.
— — *Tayl.* Fl. Hib. p. ii. 99.
— MINIATUM, c. LEPTOPHYLLUM, *Fries*, L. Ref. 408. (1831.)

Llyn Bodlyn, Merionethshire! *Rev. T. Salwey.* By Loch Lomond, near Tarbet! *Mr. Borrer.*

Mr. Borrer remarks (*in lit.* 1850), "the other specimen figured on the same plate of E. Bot. 2012, viz. fig. 1, I now regard as *E. squamulosum* or *lachneum*, Ach."

3. E. EUPLOCUM, *Ach.* Sporidia 8 in asci, elliptical without a margin. Plate II. fig. 3.

LICHEN EUPLOCUS, *Ach.* Prod. 141. (1798.)
ENDOCARPON EUPLOCUM, *Ach.* Meth. 127. t. iii. f. iv. (1803); L. Univ. 301; Syn. 102.
Hook. Br. Fl. ii. 157.
— MINIATUM, β. PUSILLUM, *Wahl.* Fl. Lapp. 462. (1812.)
— FLUVIATILE, *b. Fries*, L. Ref. 409. (1831.)
VERRUCARIA EUPLOCA, *Borr.* E. Bot. Suppl. 2602, fig. 2. (1829.)

Near Newcastle on the shore of the Tyne; an original specimen! from the discoverer Mr. Robertson, *in herb. Borrer.*

4. E. LÆTEVIRENS, *Turn.* Sporidia unknown.

ENDOCARPON VIRIDE, *Ach.* L. Univ. 300. (1810.)
VERRUCARIA LÆTEVIRENS, *Borr.* E. Bot. Suppl. 2658. (1830); *Syn.* 100. (1830.)
— — *Hook.* Br. Fl. ii. 158.
— — *Tayl.* Fl. Hib. p. ii. 101.

Aran Mowddwy, Merionethshire! *Mr. Borrer.* Mynydd-y-Myfyr, Oswestry, Shropshire! *Rev. T. Salwey.*

In the letter accompanying his specimens, Mr. Salwey writes, June 6, 1844: "One of the specimens (which I retain) has the merit of exhibiting the fruit which has hitherto been undetected. *Apothecia* black, *partly* immersed in the frond, at first globular, afterwards flattened at the top, and the apex, which is also black, projecting from it, with a narrow neck, at an oblique angle with the surface of the frond."

Mr. Borrer suggests (*in lit.* 1850), that *E. tenue* would have been a better name.

In company with Mr. Salwey I searched the Shropshire locality, 18th July, 1850, but owing to the altered state of the ground through planting, we could not detect the plant.

5. E. PSOROMOIDES, *Hook.* Sporidia 8 in asci, linear-oblong, triseptate, brown. Plate II. fig. 4.

VERRUCARIA PSOROMOIDES, *Borr.* E. Bot. Suppl. 2612. fig. 1. (1829.)
ENDOCARPON PSOROMOIDES, *Hook.* Fl. ii. 157. (1833.)

On Elm at Hurstpierpoint, and on Ash at Beeding, Sussex! *Mr. Borrer.*

The apex of the apothecium is very dark brown, which colour extends to the upper half of the tunic of the nucleus, the rest being pale. The number and form of the sporidia keep this quite distinct from *E. pallidum* and *sorediatum*. The trees on which this plant grew are now destroyed.

6. E. PULCHELLUM, *Borr.* Sporidia 8 in asci, long, linear, tapering and rounded at each extremity, 7-septate, pale-yellow. Plate III. fig. 1.

VERRUCARIA PULCHELLA, *Borr.* E. Bot. Suppl. 2602. fig. 1. (1829.)
ENDOCARPON PULCHELLUM, *Hook.* Br. Fl. ii. 158. (1833.)
— — *Tayl.* Fl. Hib. p. ii. 101.

Ireland! from Dr. Taylor, *in herb. Borrer.*

* * *Thallus adherent, scaly.*

7. E. LACHNEUM, *Ach.* Sporidia 8 in asci, elliptical, margined, pale-coloured. Plate III. fig. 2.

LICHEN LACHNEUS, *Ach.* Prodr. 140. (1798.)
— — *Sm.* E. Bot. 1698.
ENDOCARPON LACHNEUM, *Ach.* Meth. 127. (1803) L. Univ. 299;
— — *Tayl.* Fl. Hib. p. ii. 99.
LICHEN LEPTOPHYLLUS, *Sm.* E. Bot. 2012. fig. 1. (1809.)
ENDOCARPON HEPATICUM et SQUAMULOSUM, *Ach.* L. Univ. 298. & 299. (1810.)
ENDOCARPON PUSILLUM, *α. Fries*, L. Ref. 411. (1831.)
— HEDWIGII, *β.* LACHNEUM, and *γ.* SQUAMULOSUM, *Hook.* Br. Fl. ii. 156. (1833.)

Sussex Downs! St. Vincent's Rocks, Bristol! Horsham Church, Sussex! *Mr. Borrer.*

"I am inclined to regard these as one species, comprising *E. lachneum, squamulosum*, and *hepaticum*, Ach., and Dickson's plant (and Hedwig's, I suppose,) as distinct." *Mr. Borrer, in lit.* 1850.

All the above seemed identical in the section of the thallus and form of the sporidia, though differing somewhat in the thallus, whose habit varied from the appressed scaly state to that with the extremities of the lobes free.

8. E. HEDWIGII, *Ach.* Sporidia 8 in asci, oblong, margined. Plate III. fig. 3.

ENDOCARPON PUSILLUM, *Hedw.* St. Cr. ii. 56. t. 20. f. A. 1st. ed. (1784); ed. 2. (1798.)
— — *Tayl.* Fl. Hib. p. 2. 99.
LICHEN TRAPEZIFORMIS, *Dicks. Sm.* E. Bot. 595. (1799.)
ENDOCARPON HEDWIGII, *Ach.* Meth. 125. (1803); L. Univ. 298.
— — *Wahl.* Fl. Lapp. 461.
— — *Hook.* Br. Fl. ii, 156, *excl. var.*
— — *α. Fries*, L. Ref. 411. (1831.)

Sussex! *Mr. Borrer.*

9. E. SULPHUREUM, *Tayl.* Fl. Hib. pt. ii. 100. (1836.) Plate III. fig. 4.

I can distinguish only a gelatinous hyaline mass in the interior of what is called the apothecium; no asci or sporidia, nor a trace of them.

Carig, Co. Kerry! *Dr. Taylor, in herb. Borrer.*

10. E. RUGOSUM, *Tayl.* Fl. Hib. pt. ii. 258. (1836.) Plate IV. fig. 1.

Dunkerron! Original specimens from *Dr. Taylor, in herb. Borrer.*

In the specimens examined, I could distinguish nothing more than a pale-yellow, gelatinous, transparent globule or nucleus under the brown apex or summit; not a trace of asci or sporidia. The habit and appearance seem to resemble *Pertusaria* far more than *Endocarpon*.

11. E. MACROCARPON, *Tayl.* Sporidia in asci 8, oblong, margined, pale. Plate IV, fig. 2.

ENDOCARPON MACROCARPON, *Tayl.* Fl. Hib. pt. ii. 258.

Dunkerron Mountain, Ireland! *Dr. Taylor, in herb. Borrer.*

I could not satisfy myself whether the perithecium was entire or not. It was greatly incurved at the base, where it tapered off in thickness, and could apparently be traced all round. In sections made near the circumference it was decidedly entire. The nucleus was enveloped in a dark brown distinct tunic, between the base of which and the base of the perithecium was interposed a dirty white or pinkish tartareous mass.

12. E. SMARAGDULUM, *Ach.* Sporidia in asci, very minute, innumerable, oblong or linear oblong, pale yellow.

α. SMARAGDULUM. Plate IV. fig. 3.

LICHEN SMARAGDULUS, *Sm.* E. Bot. 1512. (1805.)
ENDOCARPON SMARAGDULUM, *Ach.* L. Univ. 298. (1810.)
— — *Hook.* Br. Fl. ii. 158.

β. SINOPICUM. Plate V. fig. 1.

ENDOCARPON SINOPICUM, *Ach.* Meth. Suppl. 30. (1803); L. Univ. 297; Syn. 98.
— — *Hook.* Br. Fl. ii. 159.
LICHEN SINOPICUS, *Sm.* E. Bot. 1776. (1807.)

γ. RUFO-VIRESCENS. Plate IV. fig. 4.

ENDOCARPON RUFO-VIRESCENS, *Tayl.*, Fl. Hib. p. ii. 100. (1836.)

δ. RUFESCENS.

SAGEDIA RUFESCENS, *Ach.* L. Univ., 329. (1810.)
LECIDEA RUFESCENS, *Borr.* E. Bot. Suppl. 2657. (1830.)

ε. PRIVIGNA.

LICHEN SIMPLEX, *Sm.* E. Bot., 2152. fig. on sandstone. (1810.)
LECIDEA PRIVIGNA, *Hook.* Br. Fl. ii. 184.

α. Mountainous parts of Northumberland and Durham! *Mr. Borrer.* Glandwr, Barmouth! *Rev. T. Salwey.*

β. Scotland and North Wales! *Mr. Borrer.* Glandwr, Barmouth! *Rev. T. Salwey.*

γ. Ireland! *Mr. Borrer.* Craigforda, near Oswestry, Shropshire! *Rev. T. Salwey.* Summit of the Wrekin! Stone Quarry at Middle, Shropshire!

δ. Gorlestone, Suffolk! *Mr. Borrer.*

ε. Cliffs near Rottingdean, Sussex! *Mr. Borrer.*

Mr. Borrer remarks (*in lit.* 1850), "I am inclined to join with *E. smaragdulum*, *E. sinopicum*, Ach., *E. rufovirescens*, Tayl., and *Sagedia rufescens*, Ach., (*Lecidea*, E. B. Suppl.) and *Lecidea privigna*, Ach., figured with *Lichen simplex*, Dav. in E. Bot., according to an original specimen from Mr. Harriman."

Fries (Lich. Europ. 412) considers *E. sinopicum* to be a state of *Parmelia badia*, and *E. smaragdulum* of *Parmelia cervina*. This I have not been able to test, from a want of authentic specimens of those species of *Parmelia*.

In all the above the fructification was similar. The apothecia were roundish, or flattened and long, narrow and depressed, or disciform, in different specimens, according to age. There was no appearance of a pore, but a layer of round granules on the top of the paraphyses and asci. A section showed an immense number of paraphyses, with a few oblongo-obovate asci, filled with granular matter, (*g*.) This, when discharged, exhibited, under a very high magnifying power, an innumerable multitude of very minute oblong granules, of a pale yellow colour, having the opposite ends darker, and the central portion light and transparent; thus, apparently, at first sight, with two septa, forming a three-celled sporidium. This, however, was only illusory, the sporidium being in reality without any septum, and single-celled, the three-celled appearance arising from the sporidia, in their motion, coming more or less into focus, or perhaps from some peculiar stage of their incipient germination. They were endued with a very peculiar, quick, wriggling, spontaneous motion, as in a dance *setting* and retiring one from the other, in quick succession. This motion was observed to continue, under the microscope, for several hours, but might be instantly arrested by laudanum. From the nature of the motion, I think it was most probably caused by cilia, though I could not detect their existence, precisely similar to the spores of the fresh-water algæ, as observed by Mr. Hassall. (See Hassall, 'British Fresh-water Algæ,' vol. i, p. 13, and plates I. and II.)

I greatly doubt the correctness of these plants being included in the genus *Endocarpon*. The existence of paraphyses, intermingled with the asci, and their arrangement, are precisely similar to what is seen in the patellulæ of *Parmelia*, *Lecidea*, &c. In the true Endocarpa, so far as I have hitherto observed, there are no paraphyses intermingled with the asci, and the contents of the nucleus are decidedly and visibly gelatinous.

*** *Thallus scaly, tartareous; sporidia very large.*

13. E. SOREDIATUM, *Hook.* Sporidia in asci 2, very large, lineari-oblong, obtusely rounded at each extremity, uniseptate, green-coloured. Plate V. fig. 2.

VERRUCARIA SOREDIATA, *Borr.* E. B. Suppl. 2612, fig. 2. (1829.)
ENDOCARPON SOREDIATUM, *Hook.* Br. Fl. ii. 158. (1833.)

Rottingdean Cliffs, Sussex! *Mr. Borrer.*

The nucleus is pale, gelatinous, containing in the lower portion a series of clavate or obovate erect asci, without any paraphyses intermingled, over which, from the upper portion, is suspended a quantity of minute, slender, crowded filaments, (as are observable in *Endocarpon* and *Verrucaria* generally, being, I presume, the usual structure.) The asci contain each only two very large sporidia, one more elongated than the other, which is shorter and broader, oblong, obtusely rounded at each extremity, with a central septum. The granular contents, or ultimate spores, of a bright green colour, irregular in shape, square or roundish, giving to the cellular membrane or sac of the sporidium an impressed network appearance. When mature, the membrane of the sporidium is ruptured, and the granular contents interspersed amongst the gelatinous mass of the nucleus, which is thus rendered of a green colour. By detaching one of the scales of the thallus, moistening it in water, and working away the adherent soil with a needle, it will be found that the long fibres observable on the under surface, proceed from the central portion, thus rendering each scale, or rather each plant, for the plant is only a scale, subpeltate.

14. E. PALLIDUM, *Ach.* Sporidia in asci 2, very large, lineari-oblong, rounded at each extremity, uniseptate, pale yellow. Plate V. fig. 3.

ENDOCARPON PALLIDUM, *Ach.* L. Univ. 301? (1810;) Syn. 100.
— — *Hook.* Br. Fl. ii. 157.
— — *Tayl.* Fl. Hib. pt. ii. 99.
LICHEN PALLIDUS, *Sm.* E. Bot. 2541. (1813.)
ENDOCARPON PUSILLUM *a.* PALLIDUM, *Fries*, L. Ref. 411. (1831.)

Ireland! from *Sir Thomas Gage, in herb. Borrer.*

The structure of the apothecium is, in this species, generally similar to the last. The sporidia are more uniform in size, though similarly impressed by the irregular granular contents.

15. E. LITHINUM. Sporidia in asci 2, very large, lineari-oblong, rounded at each extremity, uniseptate (or triseptate?), dull green. Plate VI. fig. 2.

VERRUCARIA LITHINA, *Ach.* Meth. Suppl. 18. (1803;) L. Univ. 287; (according to authentic specimen, from Swartz! *in herb. Borrer.*) See Plate VI. fig. 1.
PYRENULA LITHINA, *Ach.*, Syn. 127. (1814.)

Llyn Bodlyn, Merioncthshire! *Rev. T. Salwey.* Teesdale?! *Rev. Mr. Harrimann, in herb. Borrer.*

Thallus tartareous or subcrustaceous, variable in colour, either a dirty tawny white, or of a dull reddish hue, or black, always recognisable by being white underneath the surface when abraded, whatever the colour, smooth, cracked, the areolæ somewhat rugged and convex. *Apothecia* moderately large, very prominent, hemispherical, slightly conoid, covered by the thallus which margins the rather large pore. *Perithecium* dimidiate, rufous-brown; *nucleus* pale yellow; asci small, containing only 2 *sporidia*, pale brownish-green, one larger than the other. The sporidia were, in Swartz's specimen and the Teesdale one, triseptate, with smaller and finer intervening reticulations or veins (see Plate VI. fig. 1), whilst in the Llyn

Bodlyn plant there was only one well-marked septum, with numerous other horizontal divisions or reticulations (see Plate VI. fig. 2). There is little doubt, however, that all are identical.

16. E. FISSUM. Sporidia in asci, number unascertained, (probably 2,) lineari-oblong, rounded at each extremity, dark bright-brown, the internal spores arranged in regular horizontal rows, so as to give the appearance of many septa. Plate VI. fig. 3.

VERRUCARIA FISSA, *Tayl.* Fl. Hib. pt. ii. 95. (1836.)

Carig, County Kerry! *Dr. Taylor, in herb. Borrer.*

17. E. ISIDIOIDES. Sporidia in asci 8, very large, narrow-oblong, tapering towards each obtuse extremity, entire, without septum, bright brown. Plate VI. fig. 4.

VERRUCARIA ISIDIOIDES, *Borr.* E. Bot. Suppl. 2622, fig. 1. (1830.)
PERTUSARIA ISIDIOIDES, *Hook.* Br. Fl. ii. 160. (1833.)
PORINA ISIDIOIDES, *Tayl.* Fl. Hib. part ii. 102. (1836.)

Glengariff, near Bantry! *Mr. Borrer.*

The very large sporidia, although differing in number, lead me to conclude that the affinity of this plant is with the preceding three species, together with which, from the nature and number of the sporidia, it ought perhaps to be arranged correctly in a distinct and separate genus, could sufficient external characters be found to render such a division desirable.* The sporidia are of a bright brown colour, marked very regularly in horizontal series, with wrinkles or network appearance from the enclosed

* Though foreign from the present work, I may as well record here that an examination of authentic specimens! of *Verrucaria gelida*, Tayl. (Crypt. Antarctica, Plate cxcviii. fig. 4) in the herbarium of the Rev. Churchill Babington, St. John's College, Cambridge, has shown me that that plant is really an Endocarpon belonging to the present section of the genus. Each ascus contained only one large sporidium, lineari-oblong, rounded at each extremity, bright brown, triseptate, impressed with intervening reticulations or wrinkles from the granular contents. In the above work the sporidium is represented as still enclosed in the ascus, hence the peculiar shape and the hyaline margin.

granules. When in a young state, and still enclosed within the ascus, they are pale and nearly colourless, and from mutual pressure assume somewhat of a fusiform shape. The external appearance of the apex of the perithecium and its section assimilate with *Endocarpon*, whilst the character of the thallus, though partaking largely of that of *Endocarpon*, approaches, in its warty appearance and thick tartareous structure, that of *Pertusaria*.

Genus 2.—SAGEDIA, *Fries*.

Apothecium enclosed within the thallus, globose; nucleus gelatinous, deliquescing; receptacle membranaceous, thin, at length becoming black; ostiolum distinct, attenuated into a slender neck, dilated at the apex, perforated. Thallus horizontal, subcrustaceous.

This appears to be a genus framed to receive certain anomalous and differing plants, which cannot, perhaps, be correctly included either in *Endocarpon* or *Verrucaria*, though partaking, in many particulars, of the character and structure of each, and, with the last section, as here arranged, of *Endocarpon*, is apparently one of those links or gradations by which nature connects those genera.

With *Endocarpon* it corresponds, in the apothecia enclosed within the thallus and the gelatinous nucleus, but differs in the nature of the thallus, in the black receptacle, attenuated into a slender neck with a dilated perforated summit.

With *Verrucaria* it corresponds in the nature of the thallus, but differs in the absence of a true carbonaceous perithecium, the nucleus entirely enclosed in the thallus, and the ostiolum attenuated into a neck with a dilated apex. The latter being sub-carbonaceous, may easily be mistaken for a superficial perithecium.

From the "degenerate Parmeliæ," as Fries considers *Endocarpon smaragdulum*, and its varieties (as associated in this work) to be, and perhaps correctly, it differs in the nature of the nucleus and the perforated ostiolum,

approaching them, however, in general external appearance.

From the sub-tartareous section of *Endocarpon* it is distinguished by the different sporidia.

1. S. CINEREA, *Fries.* Sporidia in asci 8, narrow-oblong, uniseptate, pale. Plate VII. fig. 1.

ENDOCARPON CINEREUM, *Pers.* in Ust. Ann. Bot. vii. 28. (1794.)
LICHEN TEPHROIDES, *Ach.* Prod. 18. (1798.)
— — *Sm.* E. Bot. 2013.
ENDOCARPON TEPHROIDES, *Ach.* Meth. 129. (1803;) L. Univ. 297; Syn. 98.
— — *Hook.* Br. Fl. ii. 159.
SAGEDIA CINEREA, *Fries.* L. Ref. 413. (1831.)

Summit of Ben Lawers! Stronsay, Orkney! *Mr. Borrer.*

The yellow portion of the thallus is composed of cellular tissue, the dark substratum is spongy, very compact upwards, but looser below, and sending forth many masses of articulated brown fibres. The membranaceous apothecium is as thin as the inner tunic in many *Verrucariæ*, with a pore in the apex.

2. S. FUSCELLA, *Fries.* Sporidia in asci 8, narrow-oblong, pale. Plate VII. fig. 2.

LICHEN FUSCELLUS, *Turn.* in Linn. Trans. vii. 90. t. 8. f. 2. (1784.)
— — *Sm.* E. Bot. 1500.
VERRUCARIA FUSCELLA, *α. Ach.* L. Univ. 289. (1810.)
ENDOCARPON FUSCELLUM, *α. Ach.* l. c. 675. (1810.)
— — *Hook.* Br. Fl. ii. 159.
— — *Tayl.* Fl. Hib. pt. ii. 101.
ENDOCARPON TEPHROIDES, *β.* POLYTHECIUM, *Ach.* Syn. 99. (1814.)
SAGEDIA FUSCELLA, *Fries,* L. Reform. 413. (1831.)

Sussex! *Mr. Borrer.*

Apothecium imbedded in the yellow tartareous portion, tunic pale, nucleus paler, substratum carbonaceous, black.

3. S. VIRIDULA, *Fries*. Sporidia in asci 8, very large, broadly elliptical, granulated. Plate VII. fig. 3.

LICHEN PLACOTHALLUS, *Ach.* Prod. 18. (1798.)
ENDOCARPON VIRIDULUM, *Schrad.* Spicil. Fl. Germ. 192. (1794.)
LICHEN TESSELLATUS, *Sm.* E. Bot. 533. (bad.) (1798.)
VERRUCARIA FUSCELLA, *δ.* VIRIDULA, *Ach.* L. Univ. 289. (1810.)
VERRUCARIA VIRIDULA, *Ach.* L. Univ. 675. (1810.)
— — *Borr.* E. Bot. Suppl. after t. 2623, fig. 2.
— — *Hook.* Br. Fl. ii. 153.
SAGEDIA VIRIDULA, *Fries*, L. Reform. 414. (1831.)

Sussex! *Mr. Borrer.*

The apothecium, which is membranaceous, thin, and black, has its apex surmounted by a thickened and carbonaceous distinct substance, precisely similar to the dimidiate *perithecium* of many species of *Verrucaria*. The sporidia have a peculiarly dotted or granulate appearance from the internal granules, which prevents its being confused with *S. ochrostoma*. The thallus is, in general appearance and habit, similar to that of an *Endocarpon*, whilst the apothecia are those of a *Verrucaria*, except that they are imbedded in the thallus.

4. S. OCHROSTOMA, *Borr. MS.* Sporidia in asci 8, elliptical, margined, pale. Plate VII. fig. 4.

On plastered walls, Sussex! *Mr. Borrer.*

Thallus moderately thick, crustaceous, verrucoso-rugose, coarsely cracked into areolæ, varying in colour from a dusky cream or grey, through an olive, to a brownish-black or umber, with a rather thick bright green stratum immediately underneath the surface. *Apothecia* numerous, minute, entirely immersed in the thallus, the slightly raised hemispherico-conoid black apex only visible, perforated with a simple pore. *Tunic* thin, black, entire; *nucleus* pale.

5. S. AGGREGATA, *Fries*. Sporidia in asci 8, narrow, elongated, fusiform, 5-septate, pale. Plate VIII. fig. 1.

LICHEN OBSCURUS, *Sm.* E. Bot. 1752. (1807.)
SAGEDIA AGGREGATA, *Fries.* L. Reform. 416. (1831.)
PERTUSARIA CRASSA, *Hook.* Br. Fl. ii. 160. (1833.)
VERRUCARIA OBSCURA, *Tayl.* Fl. Hib. pt. ii. 96. (1836.)

Sussex! *Mr. Borrer.* On an old yew-tree in Cheriton Churchyard, Pembrokeshire! *Rev. T. Salwey.*

The tunic of the apothecium is pale, the nucleus white, the ostiolum dark brown, or black.

6. S. CIRCUMSCRIPTA. Sporidia in asci 8, narrow, clavate, 5-septate, dark brown. Plate VIII. fig. 2.

VERRUCARIA CIRCUMSCRIPTA, *Tayl.* Fl. Hib. pt. ii. 96. (1836.)

Shaded rocks, Kerry! *Dr. Taylor, in herb. Borrer.*

The *thallus* of this singular plant seems formed of anastomosing articulated entangled fibres, with globular bodies, containing granules interspersed. The *apothecia* are without any true perithecium, that which they possess being fibrous, of an obovate or clavate shape, darkish olive-green towards the summit, paler, and yellow beneath. Though it has most certainly no affinity with *Verrucaria*, yet it may be questioned whether the present genus is its true arrangement.

Genus 3.—CHIODECTON, *Fée.*

Apothecium verrucæform, formed of the erumpent medullary layer, pulverulent. Nuclei many, aggregated, and immersed in the thallodal warts, ceraceo-gelatinose, supported on the vertical processes or divisions of an opaque blackish-brown torus; ostiola sub-disciform, distinct, prominent, not perforated; thallus crustaceous.

An inspection of plates VIII. and IX. will at once manifest that *Syncesia albida*, Fl. Hib., is referable to this genus.

A vertical section of the wartlike apothecium shows it to be formed of the medullary layer of the thallus, within which is developed an opaque, blackish-brown, dense torus, generally similar in appearance, though not in shape, to that observable in the genus *Sphærophoron*. This torus is divided upwards into several erect processes, variable in size and form, each bearing on its summit a separate nucleus, or lamina proligera, flattened or depressed, and somewhat disciform, pale-coloured, containing narrow-obovate erect asci, intermingled with paraphyses. The asci contained sporidia, I think 8 in number, of a narrow elongated fusiform shape, triseptate, pale yellow.

The specimen of *Chiodecton myrticola*, Fée, examined, (see Plate VIII. fig. 3; and Plate IX. fig. 2,) was sent by M. Montagne to Mr. Borrer, from the Isles d'Hieres! Fée, in Part ii. of his Crypt. Exot., says that in all the species there is little or no difference in the form of the sporidia. In Tab. xl. he figures the sporidia with *many* septa, which is certainly not correct. When still contained in the asci, and lying one over the other, they do sometimes appear as if possessing many septa, but when disengaged from the asci and viewed separately, they will be found to have really no more than three septa.

The wartlike apothecia, general appearance, and structure, show its affinity with *Pertusaria*; the structure of the nucleus, supported on an opaque torus, assimilates to *Sphærophoron*.

1. CHIODECTON ALBIDUM. Sporidia 8 in asci, elongato-fusiform, triseptate, pale yellow. Plate VIII. fig. 4; and Plate IX. fig. 1.

SYNCESIA ALBIDA, *Tayl.* Fl. Hib. pt. 2. 103. (1836.)

Shaded rocks, Kerry, Ireland! *Dr. Taylor, in herb. Borrer.*

This does not accord with any species described in Fée's Crypt. Exot. His monograph, in Ann. des Sc. Nat. May, 1829, I have not seen.

Genus 4.—PERTUSARIA, D.C.

Apothecium verrucæform, normally covered by the cortical layer of the thallus, enclosing one or many waxy, gelatinous nuclei, enveloped by the thin, pale, membranaceous thallodal receptacle; ostiolum depressed, perforated; thallus crustaceo-membranaceous.

In this genus a vertical section shows the white or pale-coloured tartareous medullary layer (plate IX. fig. 3 *b*), frequently with a narrow green layer, immediately under the pale waxy membranaceous cortical layer (*a*). The apothecia (*A*) are wartlike, very numerous, and various in size, more or less confluent and deformed from their crowded state, with depressions on their summits, varying from a mere point to a disciform expansion, generally more or less coloured brown or black, bearing on the surface the minute, prominent, perforated, apices of the imbedded nuclei. Imbedded in the medullary layer are the nuclei (*c*), either solitary or numerous, surrounded with a pale, but very evident, tough, persistent, membranous tunic or receptacle (*d*), white or slightly coloured, gelatinous, consisting of large asci and numerous very slender, filiform, entangled, peculiarly floccose paraphyses (*e* and *C*). The sporidia (*B*), which are very variable in number and size, though of similar structure in all the species, have a pale yellow, or light brown central portion, enclosed in a double hyaline membrane or tegument, giving, under the microscope, the appearance of a very singular broad double margin. The enclosed granules or ultimate spores are pale yellow, and when disengaged have spontaneous motion.

Fries, Lich. Europ. 419, says that t[illegible] distinguished "nucleis omnino nudis (nulla[illegible] cinctis)." But this is assuredly incorrect, in[illegible] the nucleus is enclosed in a distinct, tough, [illegible] membranaceous, somewhat waxy tunic, very dis[illegible] able even in a dry state.

Fée figures the sporidia of foreign species as [illegible] the margin striated in a radiant manner; but in[illegible] British species this appearance, though frequently s[illegible] is not real but illusory, arising from the entang[illegible] floccose paraphyses lying over the very delicate hyali[illegible] membrane of the asci, which, together with the enclosed sporidia, in consequence appear wrinkled or striated.

1. P. COMMUNIS, *D. C.* Sporidia in asci 2, very large, elliptical, pale yellow, enveloped in a hyaline double membrane, giving the appearance of a broad, double margin. Plate IX. fig. 3.

LICHEN PERTUSUS (Linn.) *Sm.* E. Bot. 677. (1799.)
THELOTREMA PERTUSUM, *Ach.* Meth. 131. (1803.)
PERTUSARIA COMMUNIS, *D. C.* Fl. Fr. ed. 3. v. ii. 320. (1805.)
— — *Turn. & Borr.* Lich. Brit. 196.
— — *Fries*, L. Reform. 420.
— — *Hook.* Br. Fl. ii. 160.
PORINA PERTUSA, *Ach.* L. Univ. 308. (1810;) Syn. 109.
— — *Tayl.* Fl. Hib. pt. ii. 102.
ENDOCARPON PERTUSUM, *Wahl.* Fl. Lapp. 459. (1812.)

Sussex! *Mr. Borrer.* (Spec. Exsic.)! *Bohler's Lich. Brit.* Oswestry, Shropshire! *Rev. T. Salwey.*

Specimens of *P. communis* γ, Turn. and Borr., and *P. communis* δ, Turn. and Borr. (*Porina leioplaca*, Ach.*) communicated by Mr. Borrer, did not differ from *P. communis* α, except in general appearance, and colour externally. In section, under the waxy cortical layer, was a green stratum, the rest being cream-coloured; the nuclei were numerous, enclosed in a waxy membrane or tunic;

* "According to a specimen from Acharius. Fries, I see, joins the Acharian synonym with *Lichen melaleucus*, E. Bot."—*Borrer, in lit.* 1850.

[redacted]h containing 2, or not unfrequently 3, spo-
same size, colour, shape, and structure as in
is a.

[redacted]UTHOCARPA, *Turn.* and *Borr.* Sporidia 2 in
i, smaller, narrow-elliptical, pale yellow, enve-
ped in a hyaline double membrane, as in the last.
Plate IX. fig. 4.

LICHEN CEUTHOCARPUS, *Sm.* E. Bot. 2372. (1812.)
PERTUSARIA CEUTHOCARPA, *Turn.* and *Borr.* Lich. Brit. 200. (1813.)
— — — *Fries,* L. Reform. 423.
— — — *Hook.* Br. Fl. ii. 160.
POBINA CEUTHOCARPA, *Tayl.* Fl. Hib. pt. ii. 102. (1836.)

The specimen figured in E. Bot. from Ireland! *in herb. Borrer.* Barmouth! *Rev. T. Salwey.*

Mr. Borrer writes (*in lit.* 1850,) "I have a specimen from Dr. Taylor, quite proving his correctness in joining *Lichen microsticticus,* Sm. E. Bot. (t. 2243,) to *Pertusaria ceuthocarpa.* Fries refers it, under the Acharian name *Isidium lævigatum,* along with upwards of 20 more Acharian species, of various genera, to *Parmelia* (*Urceolaria*) *cinerea,* but I do not think him right."

I presume a specimen labelled "*Verrucaria,* allied to *V. Hookeri,* Borr., Pigeon Island"! sent by Dr. Taylor to Mr. Borrer, must be referred to this species. The crust of the *thallus* is cream-coloured, waxy, the surface (which seems to be for the most part destroyed) rugged or irregularly raised, irregularly and angularly cracked, with a greenish layer underneath the surface. *Apothecia* large, generally one in each areola, brownish in appearance, surrounded with a pale waxy ring, being part of the tunic exposed. *Nucleus* enclosed in a thickish, tough, pale brown tunic, the exposed upper portion with a dark brown carbonaceous (?) pseudo-perithecium; pore very large and simple. *Asci* few in number, large, surrounded at the base with a tuft of twisted entangled fibres or paraphyses, highly hygrometric. *Sporidia* 2 in each ascus, very large, linear-oblong, pale yellow, enveloped

in the double membrane peculiar to this [redacted] Plate X. fig. 1.

3. P. FALLAX, *Hook.* Sporidia in asci 8, abou[redacted] as in the last, elliptical, pale yellow, with [redacted] line double membranous envelope. Plate X[redacted]

VERRUCARIA FALLAX, *Pers.* (fide *Ach.*)
LICHEN ? HYMENIUS, *Ach.* Prod. 80. (1798.)
— — *Sm.* E. Bot. 1731.
THELOTREMA HYMENIUM, *Ach.* Meth. 133. (1803.)
— — *Turn.* and *Borr.* Lich. Brit. 185.
PERTUSARIA WULFENII, *D. C.* Fl. Fr. ed. 3. ii. 320. (1805.)
— — *Fries,* L. Ref. 424.
PORINA FALLAX, *Ach.* Syn. 110. (1814.)
— — *Tayl.* Fl. Hib. pt. ii. 102.
PERTUSARIA FALLAX, *Hook.* Br. Fl. ii. 160.

Sussex! *Mr. Borrer.* Barmouth! Oswestry, Shropshire! *Rev. T. Salwey.* Spec. exsicc.! *Bohler's Lich. Brit.*

In this the nuclei appear to have become confluent, and spread out into a disk, surrounded by the abrupted margins of the thallodal verruca, in which they were originally imbedded. The asci are very large, and the sporidia more regularly developed, being generally 8 in number, but of the same form, though smaller in size, as in *P. communis* and its varieties; the paraphyses are also similar.

4. P. MELALEUCA. Sporidia in asci 2, about the same size as the last, elliptical, pale yellow, with a hyaline double envelope or margin. Plate X, fig. 3.

LICHEN MELALEUCUS, *Sm.* E. Bot. 2461. (1812.)
THELOTREMA MELALEUCUM, *Turn.* and *Borr.* Lich. Brit. 183. (1813.)
— — *Hook.* Br. Fl. ii. 161.
PERTUSARIA COMMUNIS, d. LEIOPLACA, *Fries.* L. Ref. 421? (1831.)

St. Leonard's Forest, Sussex! *Mr. Borrer.*

The sporidia clearly show that this plant does not belong to the genus *Thelotrema.*

[redacted]LATA. Sporidia in asci 2—4, elliptical, [redacted]llow, with the double hyaline membranous [redacted]pe. Plate X. fig. 4.

[redacted]PORINA PUSTULATA. *Ach.* Lich. Univ. 309. (1810.); Syn. 110.

[redacted]sey! *Rev. T. Salwey.*

[redacted] HUTCHINSIÆ. Only one sporidium in each ascus, very large, rotundo-elliptical, pale yellow, with the usual hyaline double envelope or margin. Plate XI. fig. 1.

THELOTREMA HUTCHINSIÆ, *Turn.* and *Borr.* Lich. Brit. 178. (1813.)
— — *Borr.* E. Bot. Suppl. 2652.
— — *Hook.* Br. Fl. ii. 162.
— — *Tayl.* Fl. Hib. pt. ii. 103.

Bantry, Ireland! *Mr. Borrer.*

The form of the sporidium refers this plant also to *Pertusaria.* Perfectly distinct from *Parmelia* (*Urceolaria*) *scruposa* and its variety β. *bryophila*, as the different sporidia manifest. (See Plate XI.)

Fries, L. Reform. (p. 428) says, "An *Parmelia verrucosa?* cujus etiam exstat forma Thelotrema imitans." The sporidia determine this question.

In Mr. Borrer's herbarium is a specimen! of *Pertusaria*, growing on moss, collected by himself in the Highlands of Scotland, and which, were it not ascertained that lichens alter so much in their appearance, by growing on moss, I should be tempted to consider a distinct species. A single specimen, however, being only at present known, it must suffice to allude to it here, until further search for the plant in its localities may determine its proper position. The plant consists only of a few scattered white scales, growing on moss, from which the verrucæ arise

singly and separately, of a tawny flesh-colo somewhat depressed, the orifice still more brown; nucleus pale-yellow, or brownish in portion, hyaline above, surrounded by a pal membranous tunic; sporidia in asci 4, of about size as in *P. fallax*, elliptical, pale yellow, with a double envelope or margin. (See Plate XI. fig. 2.

Genus 5.—THELOTREMA, *Ach.*

Apothecium verrucæform, formed of the thallus, at first closed, afterwards margined with the open apex, enclosing a deeply sunken nucleus, ultimately collapsed into a depressed rigid disk, enveloped in a distinct membranaceous receptacle, lacero-dehiscent at the apex. Thallus crustaceo-cartilaginous.

1. T. LEPADINUM, *Ach.* Sporidia in asci 8, fusiform, filled with granules, arranged in numerous horizontal series, giving them a peculiar gemmate appearance, pale-yellow. Plate XII. fig. 1.

LICHEN ? LEPADINUS, *Ach.* Prod. 30. (1798.)
LICHEN INCLUSUS, *Sm.* E. Bot. 678. (1800.)
THELOTREMA LEPADINUM, *Ach.* Meth. 322. (1803;) L. Univ. 312; Syn. 115.
— — *Turn.* and *Borr.* Lich. Brit. 180.
— — *Fries*, L. Ref. 428.
— — *Hook.* Br. Fl. ii. 161.
— — *Tayl.* Fl. Hib. ii. 102.

Sussex! *Mr. Borrer.* Cors-y-gedol! *Rev. T. Salwey.* King's Wood, Roche Abbey, Yorkshire! *Bohler's Lich. Brit.*

In this the typical species of this genus, the thallodal wart (*a*) is, as it were, excavated, the apex having a large roundish aperture, at some depth within which is seen the irregularly lacerated opening of the tough sub-carti-

[redacted]ceptacle (*b*), which appears loosened from [redacted]ding thallus. Still deeper, at the bottom of [redacted]acle, appears the collapsed, rigid, disk-like [redacted]), gelatinous when moistened, covered with a [redacted]wn layer or veil, and consisting of asci enclosing [redacted] and paraphyses intermixed.

[redacted] var. β. RUPESTRE. Turn. and Borr., *Lich. Brit.* 180. [redacted]. *Fl. Hib.* pt. ii. 103. (γ. SCUTELLIFORME, Ach. *L. Univ.* [redacted],) (specimen from Dr. Taylor to Mr. Borrer!)* differs [redacted]ly in the thallus being of a deep yellow or ochrey [redacted]olour, the receptacle of a darker brown, and the whole [redacted]apothecium more open and deformed: the sporidia being alike in both, the only difference being that very few asci appeared developed in this, and that each ascus contained only one or two sporidia. (See Plate XII. fig. 2.)

The form of the sporidia being attended to, it can never be confounded with any state of *Parmelia* (*Urceolaria*) *scruposa*. (See Plate XI.)

2. T. EXANTHEMATICUM, *Ach.* Sporidia in asci 8, linear-oblong, slightly tapering towards each rounded extremity, triseptate, pale yellow. Plate XII. fig. 3.

LICHEN EXANTHEMATICUS, *Sm.* in Linn. Trans. i. 81. t. 4. f. 1. (1791;) *Sm.* E. Bot. 1184; (the magnified fig. admirably characteristic.)
VOLVARIA EXANTHEMATICA, *D. C.* Fl. Fr. ed. 3. ii. 373. (1805.)
THELOTREMA EXANTHEMATICUM, *Ach.* L. Univ. 313. (1810;) Syn. 116.
— — *Hook.* Br. Fl. ii. 161.
— — *Tayl.* Fl. Hib. pt. ii. 103.
GYALECTA ? EXANTHEMATICA, *Fries*, L. Ref. 197. (1831.)

Sussex Downs! North of England! Killarney! *Mr. Borrer.*

In *Thelotrema exanthematicum* the apothecia in an early state appear at first sight to possess few of the

* The Rev. T. Salwey has also gathered this variety at Llyn Bodlyn, Merionethshire!

characters of this genus, but if examined [redacted] mature state, the generic characters become [redacted] loped. For then the stellato-radiant sections [redacted] lodal wart are drawn open, and the thallodal o[redacted] portionately enlarged, within which is seen th[redacted] brown disk of the nucleus, encompassed by the la[redacted] remains of the upper portion of the receptacle. I[redacted] species the nucleus is not depressed, as in the prece[redacted] but entirely fills the receptacle. The structure is [redacted] more clearly seen by dissecting out the nucleus a[redacted] receptacle from the thallodal wart, from which it easi[redacted] separates entire. It will be found to be in shape not very unlike a minute vertebral joint, (Plate XII. C.) cylindrical, flattened at the top and base, enveloped in a thin but very distinct, yellow, semi-opaque membrane (*b*), thickened towards the base (*c*), and bearing at the summit several darker-brown, sub-cartilaginous, irregularly-formed, erect processes (*a*), the lacerated divisions of the once-closed receptacle, which surround the now exposed disk. (See Plate XII.)

The sporidia keep this quite distinct from *Gyalecta cupularis*, Schær. (*Lecidea marmorea*, Ach.), and several other allied plants, represented in Plates XIII. XIV. XV. fig. 1.

Tribe III.—VERRUCARIEÆ, *Fries.*

Apothecium rounded; proper receptacle closed, (*perithecium*,) perforated by a contiguous pore (*ostiolum*); nucleus gelatinous, sub-hyaline, diffluent; thallus crustaceous.*

* "I cannot be certain, but I imagine that Fries uses '*ostiolum contiguum*' for the opening in the perithecium itself, in Verrucarieæ, in opposition to '*ostiolum discretum*,' the opening distinct from the perithecium, in Endocarpeæ, viz., in the superimposed black mass in Sagedia and Chiodecton, and in the thallus itself in Endocarpon, Pertusaria, and Thelotrema.

"Again, he distinguishes the nucleus as '*deliquescens*' in the former tribe,

[redacted]guishing characteristic of this tribe is the [redacted]is perithecium. This, in the typical genus [redacted], is either entire, *i. e.* completely surrounding [redacted]us on all sides (see Plate XV. fig. 3. *A a.*), [redacted]diate, covering the upper portion only of the [redacted]s, but deficient at, and not subtending the base. [redacted]Plate XVII.) The perithecia are usually pro-[redacted]nt, more or less immersed in the thallus, round or [redacted]bose, not attenuated into a neck, perforated at the [redacted]ex with a large and distinct pore. The interior is [redacted]ned with a thin membranaceous tunic, usually pale-coloured, sometimes black (see Plate XV. fig. 3. *A b.*), enveloping the nucleus (see Plate XV. fig. 3. *A c.*), which is usually white, gelatinous, sub-hyaline, consisting of asci enclosing sporidia.

Genus I.—SEGESTRELLA, *Fries.*

Perithecium solitary, ceraceo-membranaceous (coloured), ostiolum simple, subpapillate, nucleus gelatinous, sub-hyaline; thallus crustaceous.

1. S. THELOSTOMA, *Fries.* Sporidia 8 in asci, elliptical, margined, pale yellow. Plate XV. fig. 2.

VERRUCARIA THELOSTOMA, *Ach.* in Winch. ii. 44. (1807.)
LICHEN THELOSTOMUS, *Sm.* E. Bot. 2153. (1810.)
PYRENULA UMBONATA, *Ach.* L. Univ. 316. (1810); Syn. 121.
SEGESTRELLA THELOSTOMA, *Fries*, L. Ref. 429. (1831.)
LECANORA THELOSTOMA, *Hook.* Br. Fl. ii. 189. (1833.)

Near Eglestone, Durham! *Mr. Borrer.*

In this plant there is certainly no appearance of a

and '*diffluens*' in the latter. I suppose, therefore, that by '*diffluens*' he means (not fluid or dissolving, but) of loose structure, not compact, such as is found in the disc of Parmelia, &c., yet not '*fatiscens*' as in Sphærophoreæ. Yet, if I am right in this conjecture, the distinction seems to have been an afterthought; for in the 'Clavis Dispositionis,' p. 8, he gives the Verrucarieæ a *deliquescent* nucleus. He uses the term again, too, in the *char.* of the genus Verrucaria."—*Mr. Borrer, in lit.* 1850.

nucleus, properly speaking. The asciger[illegible] rests indeed upon a thin tunic (*b*), somewha[illegible] that of Pertusaria, but it does not surround [illegible] subtending the base. Neither is there any por[illegible] top of the asci and paraphyses is a roundish, dar[illegible] layer (*c*), occupying the centre, around that a[illegible] portion (*d*), as if the layer was there thinner th[illegible] disruption, then a darker ring (*e*), and beyond that a[illegible] a paler disrupted ring (*f*), outside of which is the th[illegible] margin of the thallodal wart (*g*). (See Plate X[illegible] fig. 2.) The asci were in a young state, and with diffi[illegible] culty seen; they contained 8 sporidia, also in a young gelatinous condition.

I incline to think that there is some foundation for hazarding a conjecture that this genus is improperly placed among the Angiocarpi.

Genus II.—VERRUCARIA, *Pers.*

Perithecium solitary, corneo-carbonaceous (black), ostiolum simple, papillæform, or perforated; nucleus gelatinous, fluid or deliquescing, sub-hyaline; thallus crustaceous.

*CORTICOLÆ.

†*Perithecium entire, completely enveloping the nucleus.*

1. V. NITIDA, *Schrad.* Sporidia in asci 8, elliptical or oblong, slightly tapering towards each extremity, triseptate, brown. Plate XV. fig. 3.

SPHÆRIA NITIDA, *Weig. Sow.* E. Fungi. t. 275. (1800.)
VERRUCARIA NITIDA, *Schrad.* Journ. 1801. fasc. i. p. 79.
— — *Ach.* L. Univ. 279.
— — *Borr.* E. Bot. Suppl. 2607. fig. 1.
— — *Fries.* L. Ref. 443.
— — *Hook.* Br. Fl. ii. 149.
— — *Tayl.* Fl. Hib. p. ii. 87.
PYRENULA NITIDA, *Ach.* Syn. 125. (1814.)

[redacted] Shropshire! *Rev. T. Salwey.* Gopsal, [redacted]e! *Rev. A. Bloxam.* New Forest, Hants.! Spec. exsic.! *Bohler's Lich. Brit.*

[redacted]minute pale dots on the crust of the thallus are [redacted]rotuberances, or elevated excrescences.* The large [redacted]te spores, one in each of the cells of the sporidium, [redacted]a very singular appearance to them, peculiar to this [redacted]ies, and unmistakeable.

DERMATODES. Sporidia in asci 8, precisely similar in shape, colour, division, and appearance to those of *V. nitida*, though only about half the size. Plate XV. fig. 4.

VERRUCARIA DERMATODES, *Borr.* in E. Bot. Suppl. 2607. fig. 2. (1829.)
— — *Hook.* Br. Fl. ii. 149.
— — *Tayl.* Fl. Hib. pt. ii. 87.

Specimens described in E. Bot. Suppl., *in herb. Borrer!*

The perithecium is very distinctly figured in E. Bot. Suppl., as being deficient at the base; but my examination of the specimens used for that work has convinced me that there must be some mistake; for I find the perithecium to be perfectly entire, and to subtend the base of the nucleus, precisely as in *nitida*. The nucleus in both plants is brown in a dry state, whitish and hyaline when moistened. The sporidia prevent this from ever being confounded with any state of *V. epidermidis*, or *V. cinerea*.

Examination of Mr. Borrer's specimens (on Holly, Askew Wood, Ireland! *Dr. Taylor*) proved that the Verrucaria represented in E. Bot. Suppl. 2607. fig. 2 *b*,

* These, Mr. Borrer (in *lit.* 1850) says, "I always find present on British specimens, but not on the *morsels* that I have seen from Acharius." They did not exist on an abundant collection of the species which Mr. Spruce made in the Pyrenees.

with a paler or cream-coloured thallus, was [redacted] *Pers.*; the darker yellow one alone being *der*[redacted]

2. V. RHYPONTA, *Ach.* Sporidia in asci 8, very linear-oblong, uniseptate, pale yellow. Plate [redacted] fig. 1.

VERRUCARIA RHYPONTA, *Ach.* L. Univ. 282. (1810); Syn. 89.
— — *Borr.* E. Bot. Suppl. 2597. fig. 2.
— — *Fries.* L. Ref. 448.

Sussex! *Mr. Borrer.*

Distinct from *V. olivacea*, Pers., and the intermediate plant found on beech bark, in the New Forest, by Mr. Lyell (which it is proposed to call *V. Lyellii*), both of which range in the section with dimidiate perithecia.

3. V. BIFORMIS, *Borr.* Sporidia 8 in asci, oblong, more or less pointed at each extremity, sometimes one end rounded, and the other pointed, uniseptate, the cells unequal in size, containing one, two, or sometimes three round ultimate spores in each cell. Plate XVI. fig. 2.

VERRUCARIA BIFORMIS, *Borr.* in E. Bot. Suppl. 2617. fig. 1. (1829.)
— — *Fries.* L. Ref. 446.
— — *Hook.* Br. Fl. ii. 150.
— — *Tayl.* Fl. Hib. pt. ii, 89.

Sussex! *Mr. Borrer.* Shelton Rough! Weir Coppice! Haughmond Hill! all near Shrewsbury. Loppington, Shropshire!

Asci linear, very narrow and slender, rounded at the apex. Sporidia in single series. Perithecium globose, entire, subtending the base of the nucleus, not more than one fourth or one third the size of those of *gemmata*, with which it not unfrequently grows on the same tree; they are also more numerous and crowded than in *gemmata*. The very white thallus is limited by a black line. "Not

[redacted]," however, as Mr. Borrer observes (*in lit.* [redacted] small young specimens, on oak trees, the [redacted]rface is suffused with black. See E. Bot. [redacted]g. 1 *b*."

[redacted]nguished from *V. olivacea, cinerea,* and *gemmata,* [redacted] entire perithecium and differently shaped sporidia, [redacted]rom *V. rhyponta* by the different sporidia, not to [redacted]tion various particulars of difference in the thallus [redacted] size of the apothecia.

[redacted]An original specimen! of *V. byssacea,* Fl. Hib. p. ii. 89, [redacted]ent by Dr. Taylor to Mr. Borrer, with his first MS., name, "*Verr. cancellata,* Nobis, from Ardtully, county Kerry," is evidently nothing more than *V. biformis,* (see Plate XVI. fig. 3.) The cancellate appearance of the thallus seemed to arise from the horizontal walls of the cells of the epidermis having been eaten away by insects, or probably collapsed, leaving the vertical walls remaining. The synonym of Acharius must be excluded from the plant of Fl. Hib., the true *V. byssacea* being quite a different thing, and belonging to the genus Pyrenothea. A specimen! in Mr. Borrer's herbarium, labelled "*V. byssacea (vera) Schærer,*" has the perithecium dimidiate, with a light-coloured inner tunic, nucleus white, sporidia free, not in asci, broadly linear, rounded at each end, triseptate, pale-yellow. (See Plate XVI. fig. 4.)

A specimen! of "*V. byssacea, var. stictica,*" from Schleicher, *in herb. Borrer.* showed a globose, somewhat ampullæform perithecium perfectly entire, immersed in the bark, the apex free; sporidia in asci 8, very slender and delicate, of an acicular, or very narrow fusiform shape, tapered considerably towards each extremity, peculiarly curved, bearing a singular resemblance to a very minute Closterium, pale-yellow, with 3 or 5 septa, but I am uncertain which, as, from their extreme delicacy, I could not accurately determine. I incline to regard this as a fungus, probably a Sphæria. (See Plate XVI. fig. 5.)

††*Perithecium dimidiate, not subtending the nucleus.*

4. V. CONFERTA, *Tayl.* Sporidia 8? in ea elongato-obovate, uniseptate, the upper considerably larger than the lower one, brig nut brown. Plate XVII. fig. 1.

V. CONFERTA, *Tayl.* Fl. Hib. pt. ii. 87.

On birch, Askew Wood, county Kerry! *Dr. Taylo herb. Borrer.*

A very singular plant, both in its habit and the for and size of the sporidia. Except that the perithecium does not subtend the base of the nucleus, there is every feature about it to lead one to consider it a Sphæria. A note attached to Mr. Borrer's specimen seems to infer that the Rev. Churchill Babington has, by comparison of authentic specimens, identified it with *Sphæria scoriadea*, Fries, El. Fung. 2. 87.

5. V. CINEREA, *Pers.* Perithecium convex, incurved at the base; sporidia 8 in asci, elongato-oblong, slightly tapered towards each extremity, constricted in the middle, uniseptate, pale-yellow. Plate XVII. fig. 2.

VERRUCARIA CINEREA, *Pers.* in Ust. Ann. st. 7. 28. t. 3. f. 6. *A. a.* (1794.)
Schrad. Spic. Fl. Germ. 109. t. 2. f. 2.
— — *Hook.* Br. Fl. ii. 149.
— — *Tayl.* Fl. Hib. pt. ii. 88.
LICHEN STIGMATELLUS, *Ach.* Prod. 15. (1798.)
— — *Sm.* E. Bot. 1891.
VERRUCARIA STIGMATELLA, *Ach.* Meth. 117. (1803.) *a.* L. Univ. 276; Syn. 89.
VERRUCARIA PUNCTIFORMIS, *Fries.* L. Ref. 447 (excl. syn. in part) (1831.)*

Sussex! *Mr. Borrer.* On holly, Askew Wood, Ireland! *Dr. Taylor, in herb. Borrer.*

* Fries, (l. c.,) says that the perithecia of his *V. punctiformis* are "typice *integra*, sed basis innata sæpius obliteratur, tamen inflexa est." To gather

[redacted]hecia, when viewed from above, are round in [redacted]e, the imperforation very minute, round. The [redacted]n is represented in E. Bot. as entire.

[redacted]IDERMIDIS, *Ach.* Perithecium conoid, depressed [redacted]d spreading at its base; sporidia 8 in asci, linear-[redacted]blong, rounded and sometimes a little spreading at the extremities, constricted in the middle, uniseptate, pale-yellow, with a broad white margin, not unlike the figure of 8. Plate XVII. fig. 3.

VERRUCARIA EPIDERMIDIS, *α. Ach.* L. Univ. 276. (1810); Syn. 89.
— — *α. Hook.* Br. Fl. ii. 149.
— — *α. Tayl.* Fl. Hib. pt. ii. 88.
— — *β. Fries,* L. Ref. 447 (excl. syn. in part).

Sussex! *Mr. Borrer.* Oswestry, Shropshire! *Rev. T. Salwey.* Spec. exsicc.! *Bohler's Lich. Brit.*

β. ANALEPTA, *Hook.* Perithecium more convex, not so perfectly conoid; the other characters similar. Plate XVII. fig. 4.

LICHEN ANALEPTUS, *Ach.* Prod. 15. (1798.)
— — *Sm.* E. Bot. 1848.
VERRUCARIA ANALEPTA, *Ach.* Meth. 119. (1803;) L. Univ. 276; Syn. 88.
VERRUCARIA EPIDERMIDIS, *α. Fries,* L. Ref. 447. (1831.)
— — *β. Hook.* Br. Fl. ii. 149. (1833.)
— — *Tayl.* Fl. Hib. pt. ii. 88.

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his meaning of this phrase, we must refer to his observations on the "Corticolæ * * minores," p. 445, where he states that the only constant character they possess is in the difference of the perithecia being either dimidiate or entire. Of this difference, so important to be noted in the examination of Verrucariæ, he writes—"Typice eam quidem constantem habemus, sed varia ratione temperatur. Ubi basis perithecii dimidiati divergit, cujus evidentissimum exemplum offert *Verrucaria conoidea*, absolute constans est; ubi vero basis convergit, ut in *V. Dufourei*, sæpius in minus evoluto statu passim hiatus vix palpabilis ut fere contigua appareat. Cum perithecia integra a crusta rite evoluta recipiuntur, normalem suam structuram semper servant, verum crusta macilenta, perithecii matrici ipsi adnatis, basis subinde obliteratur, tam in saxis durioribus (vix in calcareis laxioribus), quam supra epidermidem, (minus in perithecis primitus obtectis prioris sectionis. [*Corticolæ * majores*].)"

Sussex! *Mr. Borrer.* Bickley Coppice, near Shrewsbury!

The apothecia, in both varieties, when viewed from above, are oblong in their outline, and the rather large imperforation partakes of the same shape. The spreading base of the perithecium gives the appearance of a paler black cloud or shading off around the apothecia.

Verrucaria Cerasi, Schrad. and Ach. 276, which Fries makes synonymous with *V. epidermidis*, Ach., has, in specimens! collected in the Pyrenees by Mr. Spruce, a perithecium generally similar to that of *epidermidis;* but the sporidia are very narrow, linear-oblong, triseptate, and the asci are of a very peculiar form, like the *cartouche* in Egyptian inscriptions.

7. V. PUNCTIFORMIS, *Pers.* Perithecium hemispherical, spreading at the base; sporidia 8 in asci, very minute, linear-oblong, uniseptate, pale-yellow. Plate XVII. fig. 5.

"VERRUCARIA PUNCTIFORMIS, *Pers.* in Ust. Ann. st. 11. 19." (1794.)
— — *a. Ach.*, L. Univ. 274; Syn. 87.
— — *Hook.* Br. Fl. ii. 150.
— — *Tayl.* Fl. Hib. pt. ii. 88.
LICHEN PUNCTIFORMIS, *Ach.* Prod. 18. (1798.)
— — *Sm.* E. Bot. 2412.
"LICHEN MYACOPROIDES, *Ehrh.* Crypt. 264."

Sussex! *Mr. Borrer.*

The very minute apothecia viewed from above are round in their outline, like those of *V. cinerea*, not oblong as in *epidermis* and its variety *analepta*, and the imperforation is round and very large. *V. punctiformis*, Fries, 447, is not our plant, but rather our *V. cinerea.*

8. V. OLIVACEA, *Pers.* Sporidia 8 in asci, of a very singular clavate shape, 7-septate, pale yellow. Plate XVIII. fig. 1.

"VERRUCARIA OLIVACEA, *Pers.* in Ust. Ann. st. 7. 28. t. 3. f. 6. *B. a. b.*" (1794.)
— — *Borr.* E. Bot. Suppl. 2597. fig. 1.
— — *Hook.* Br. Fl. ii. 150.
— — *Tayl.* Fl. Hib. pt. ii. 89.
VERRUCARIA CARPINEA, *Ach.* Meth. 120. (1803); L. Univ. 281; Syn. 88.
— *Fries,* L. Ref. 448.

Sussex! *Mr. Borrer.*

Crust of the thallus much thicker, darker coloured, and more cracked than in the following; the apothecia are dull, opaque, and rugose, invested with the crust; perithecia dimidiate, carbonaceous, black, nucleus white.

9. V. FUSIFORMIS, *nov. sp.* Crust determinate, very thin, filmy, continuous, very slightly cracked, roughish, olive-green; apothecia minute, hemispherical, black, glabrous, not invested with the crust, slightly polished and shining; sporidia 8 in asci, fusiform, triseptate, pale yellow. Plate XVIII. fig. 2.

Sussex! *Mr. Borrer. Verrucaria olivacea! Bohler's Lich. Brit.*

Very similar in general appearance to *V. olivacea*, but distinguished by the above characters. The perithecium is dimidiate, carbonaceous, black, with a pale inner tunic, nucleus white.

10. V. LYELLII, *nov. sp.* Crust determinate, filmy, continuous, scarcely cracked, smooth, pale olive-gray or green; apothecia very minute, crowded, hemispherical, somewhat conical, black, glabrous, polished, and shining; sporidia 8 in asci, linear-oblong, uniseptate, pale yellow. Plate XVIII. fig. 3.

New Forest, Hants! *Mr. Lyell, in herb. Borrer.*

This is the plant spoken of in E. Bot. Suppl. under *Verr. rhyponta*, 2597, fig. 2, as found on beech bark, in the New Forest, by Mr. Lyell. It is very distinct in general appearance from either of the two preceding species. Perithecium dimidiate, carbonaceous, black, inner tunic pale, nucleus white. Except that the nucleus is not black, this plant assimilates to the description of *V. pulla*, Ach., L. Univ., 281. I could not detect the asci, but from the pulpy mass remaining after the discharge of the sporidia, I have no doubt of their existence.

11. V. GEMMATA, *Ach.* Sporidia 8 in asci, broadly oblong, uniseptate, pale. Plate XVIII. fig. 4.

LICHEN GEMMATUS, *Ach.* Prod. 17. (1798.)
LICHEN MELALEUCUS, *Ach.* Prod. 17. (1798.)
VERRUCARIA MELALEUCA, *Ach.* Meth. 117. (1803.)
VERRUCARIA GEMMATA, *Ach.* Meth. 120. t. 3. f. 1; L. Univ. 278. t. 4. f. 2; Syn. 90.
— — *D. C.* Fl. Fr. ii. 315.
— — *Purton*, Midl. Fl. iii. 162.
— — *Borr.* E. B. Suppl. 2617. fig. 2.
— — *Hook.* Br. Fl. ii. 150.
— — *Tayl.* Fl. Hib. pt. ii. 89.

Sussex! *Mr. Borrer*. Near Twycross, Leicestershire! *Rev A.. Bloxam*. Spec. exsicc.! *Bohler's Brit. Lich.* Llanforda, Shropshire! *Rev. T. Salwey*. Loppington, Shropshire!

Asci linear, rounded at the apex; sporidia in a single series; apothecia very large, few, scattered, not crowded as in *V. biformis;* perithecium dimidiate, inner tunic pale brown. Thallus of a duller white, or rather cream-colour, than in *V. biformis*.

Specimens labelled *V. alba*, by Rev. Churchill Babington, from Sussex, and Hartshill Hays, Warwickshire, (Plate XVIII. fig. 5,) have proved, on examination, to possess characters identical with this. I have never seen any plant with entire perithecia described by Fries as

belonging to *V. alba*. The synonymy of Fries's *alba* and *gemmata* I am unable to unravel. *V. epipolea* differs from it by the differently shaped sporidia and the spreading base of the perithecium; and *V. biformis* by the entire perithecium and its peculiarly shaped sporidia.

Verrucaria niveoatra, Borr.; *V. rudis*, Borr.; *V. aphanes*, Borr.; and *V. leuco-cephala*, Ach., have no asci, the sporidia being free, and are, therefore, referable to the genus *Pyrenothea*.

** Saxicolæ.

A. Perithecium entire.

12. V. LÆVATA, *Ach.* Sporidia in asci 8, elliptical, margined, pale. Plate XIX. fig. 1.

Verrucaria lævata, *Ach.* L. Univ. 284. (1810.); Syn. 94.
— — *Borr.* E. Bot. Suppl. 2623. fig. 2.
— — *Hook.* Br. Fl. ii. 153.
— — *Tayl.* Fl. Hib. pt. ii. 91.
Verrucaria rupestris β. lævata, *Fries*, L. Ref. 437. (1831.)

The two specimens! figured in E. B. Suppl. *in herb. Borrer.*

A section of the tumid elevations on specimens found by Mr. Robertson by the Tyne, near Newcastle, (see E. B. Suppl. l. c.) showed the medullary layer to be stained with brownish-black streaks; the apothecium raised towards the summit of the wart; the perithecium rather more rounded but entire; the sporidia of the same form; leaving no doubt of the correctness of its reference to this species. (See Plate XIX. fig. 2.) Abundantly distinct from *V. rupestris* and *immersa*.

13. V. MURINA, *nov. sp.*. Sporidia in asci 8, elliptical, margined, pale yellow. Plate XIX. fig. 3.

Dunkerron! *Dr. Taylor, in herb. Borrer.*

Thallus thin, tartareous, mouse-coloured. Apothecia large, prominent, one half above the thallus, the other half immersed in a minute cavity of the rock, dark brown. Perithecium in section having somewhat of a broad depressed ampullæform shape, very thick and stout, nucleus white.

This Dr. Taylor named "*V. Harrimanni*, Ach.?" but it is certainly not the E. Bot. plant, which, as Mr. Borrer informs me, came, like Acharius's specimen, from Mr. Harrimann himself. The authentic morsel! *in herb. Borrer*, from Mr. Harrimann is a much more minute plant, having the thallus indeed of a somewhat similar colour, but the perithecium is flat and dimidiate, the pale yellow nucleus without any visible tunic entirely sunk in the rock. Not a trace of asci nor sporidia discoverable. (See Plate XIX. fig. 4.)

14. V. PLUMBEA, *Ach.* Sporidia in asci 8, elliptical, margined, pale yellow. Plate XIX. fig. 5.

VERRUCARIA PLUMBEA, *Ach.* L. Univ. 285. (1810); Syn. 93.
— — *Fries*, L. Ref. 438.
— — *Hook.* Br. Fl. ii. 153.
— — *Tayl.* Fl. Hib. pt. ii. 91.
LICHEN PLUMBOSUS, *Sm.* E. Bot. 2540. (1813.)

Near Middleton in Teesdale! *Rev. J. Harrimann, in herb. Borrer.* Craig-y-Rhiw, parish of Oswestry, Shropshire!

The square-shaped section of the perithecium is remarkable; nucleus white.

A specimen! among the collection of Mr. Harrimann's Lichens, *in herb. Borrer*, which from its accordance with Acharius's description, Mr. Borrer supposed might be *V. glaucina*, Ach., seemed to me identical with *V. plumbea*.

15. V. MURALIS, *Ach.* Sporidia in asci 8, linear-oblong, uniseptate, singularly wrinkled by the enclosed ultimate spores, greenish-yellow. Plate XX. fig. 1.

VERRUCARIA MURALIS *a.*, *Ach.* Meth. 115. 1803; L. Univ. 288; Syn. 95.
— — *Borr.* E. Bot. Suppl. 2647, fig. 2.
— — *Fries*, L. Ref. 436?
— — *Hook.* Br. Fl. ii. 154.
— — *Tayl.* Fl. Hib. pt. ii. 91.

On the mortar of the bridge below Llyn Bodlyn, Merionethshire! *Rev. T. Salwey.* Sussex! *Mr. Borrer.*

I presume this to be the true *V. muralis*, inasmuch as it agrees with the figure and description of E. Bot. Suppl. in the perithecium being entire. Another plant grows on mortar which has smaller apothecia, and a dimidiate perithecium, more or less spreading at the base, the nucleus enclosed in a very pale brown tunic, the sporidia oblong without any septum, minutely granulated. This is probably not unfrequently confounded with *V. muralis*, from which the above characters keep it distinct. It is inserted hereafter under the name of *V. patula.*

16. V. LITORALIS, *Tayl. MS.* Sporidia in asci 8, oblong, uniseptate, pale. Plate XX. fig. 2.

VERRUCARIA MURALIS var. *Tayl.* Fl. Hib. pt. ii. 92. (1836.)

Maritime rocks, Kerry! *Dr. Taylor, in herb. Salwey.* On rocks and stones liable to be covered by the tide, Dunkerron! *Dr. Taylor, in herb. Borr.*

Thallus thin, tartareous, continuous, pale, greenish-grey. Apothecia numerous, crowded, sessile, the base only immersed in very slightly elevated portions of the thallus, very prominent and peculiar in form, teatlike, depressed on the summit, with a rather large depression or pore, black, shining. Perithecium thick, and entire.

17. V. GEMMIFERA, *Tayl.* Sporidia in asci 8, very minute, broadly elliptical, uniseptate, dark bright-brown. Plate XX. fig. 3.

VERRUCARIA GEMMIFERA, *Tayl.* Fl. Hib. pt. ii. 95. (1836.)

Dunkerron! *Dr. Taylor, in herb. Borrer and Salwey.* Craigforda, near Oswestry, Shropshire! *Rev. T. Salwey.* Haughmond Hill, Shropshire!

The section of the perithecium has a peculiar square shape, nucleus brown.

In Mr. Borrer's herbarium is a specimen unnamed! sent by Mr. Harrimann, from the north of England, in which the crust has not the usual blueish-gray tinge, but is white and thick, like that of *V. Gagei;* the perithecium entire; nucleus brown; the asci contained an immense number of very small sporidia, of a broadly elliptical shape, uniseptate, bright-brown, half the size of those of *V. gemmifera.* (See Plate XX. fig. 4.)

A specimen! precisely similar in all the above particulars occurs in the herbarium of the Rev. Churchill Babington, St. John's College, Cambridge, gathered by him at Loch Coriskin, Skye. Notwithstanding the colour of the thallus, the different size and number of the sporidia, there cannot be a doubt but that both are referable to *V. gemmifera.*

18. V. RUGULOSA, *Borr.* (*in lit.* 1850.) Sporidia in asci 8, minute, oblong, uniseptate, dark-brown. Plate XXI. fig. 1.

On old walls, near Lewes, Sussex! *Mr. Borrer.*

Thallus tartareous, rather thick, of a tawny yellow, with a green stratum underneath, cracked into rather large smooth areolæ, which have their edges raised and minutely crenulated or waved, thus giving the whole plant a singular undulate appearance. Apothecia, one or several on each areola, frequently crowded, small, very

prominent, yet one-half immersed in the thallus, hemispherico-conoid, with a round simple pore on the summit, brownish-black. Perithecia entire; nucleus white when moist.

Apparently a very distinct and well-marked species, hitherto unnoticed, and yet there are several features about it which lead one to imagine it may possibly be a state of *V. gemmifera*.

19. V. PERIPHERICA, *Tayl.* Sporidia in asci 8, constricted in the middle, formed of two short obtuse cones set base to base, triseptate, dark bright-brown. Plate XXI. fig. 2.

VERRUCARIA PERIPHERICA, *Tayl.* Fl. Hib. pt. ii. 97. (1836.)

Carig Mountain, county Kerry! *Dr. Taylor, in herb. Borrer.* Barmouth, N. Wales! *Rev. T. Salwey.*

The entire perithecia have very much the shape of those of some Sphæriæ; nucleus brown.

20. V. UMBROSA, *Tayl.* Sporidia in asci 8, linear-oblong, very narrow, slightly tapered towards each extremity, triseptate, pale-yellow. Plate XXI. fig. 3.

VERRUCARIA UMBROSA, *Tayl.* Fl. Hib. pt. ii. 97. (1836.)

Carig, county Kerry! *Dr. Taylor, in herb. Borrer.* Craigforda, near Oswestry, Shropshire! *Rev. T. Salwey.*

Mr. Salwey (*in lit.* 1844) says, "Dr. Taylor now regards *umbrosa* as an Opegrapha." Whether this be so or not must be left uncertain at present, and the plant retained here for the present with doubt. It is rare, and difficult to obtain in perfect fructification.

21. V. MACROSTOMA, *D. C.* Sporidia in asci 8, elliptical, margined, pale. Plate XXI. fig. 4.

VERRUCARIA MACROSTOMA, *De Cand.* Fl. Fr. ed. 3. 2. 319. (1805.) *Fries*, L. Ref. 439.

Sussex! *Mr. Borrer.* Thringstone, Leicestershire! *Rev. Churchill Babington.* Breedon Hill, Leicestershire! Walls of Castle Farm, Pulley, near Shrewsbury, Shropshire!

Thallus thick, crustaceous, olive-tawny, very much cracked, areolæ rather large, somewhat rugged, or raised into small irregular warts or scaly elevations. *Apothecia* tolerably large, one or several immersed in each areola, black, the apex more or less prominent. *Perithecium* entire, black; nucleus white. The crust of the thallus being of an uniform texture, without any black substratum, and the cracks separating the areolæ consequently deep and empty, prevent this from being confounded with *V. polysticta,* which grows in similar situations on old walls. It has doubtless been passed over as a variety of *V. nigrescens,* from which the structure of the thallus and perithecium separate it.

22. V. POLYSTICTA, *Borr.* Sporidia in asci 8, narrow-oblong, margined, pale-yellow. Plate XXI. fig. 5.

VERRUCARIA POLYSTICTA, *Borr.* E. Bot. Suppl. 2741. (1832.)

Sussex! *Mr. Borrer.* Suffolk? *Rev. G. R. Leathes.*

The singular nature and appearance of the thallus distinguish this at first sight. It seems formed of an extremely thin tartareous smooth and even layer, white, yellow or green, which is cracked, as it were, by contraction, into minute, very angular, areolæ or scales, exposing in the interstices the thick black substratum immediately underneath.

B. PERITHECIUM DIMIDIATE.

* *Perithecium incurved at the base.*
† *Inner tunic black.*

23. V. TRACHONA, *Taylor.* Sporidia in asci 8, fusiform, triseptate, pale yellow. Plate XXII. fig. 1.

VERRUCARIA TRACHONA, *Tayl.* Fl. Hib. pt. ii. 93. (1836.) excl. syn.

Derriquin, Co. Kerry! *Dr. Taylor in herb. Borrer.*

The perithecium of this plant is described in Fl. Hib. as subtending the base of the nucleus. This at first sight is difficult to determine on account of the dark colour of the perithecium, the inner tunic and the nucleus, when dry; but careful observation will, I believe, prove that the perithecium is not entire, the dark nucleus (white when moistened) being enveloped in a very tough, thick, black tunic.

The variety "on rocks in Askew wood," (original specimen! from Dr. Taylor, *in herb. Borrer*,) does not differ in the apothecia and sporidia. (See Plate XXII. fig. 2.)

The section of the apothecium and the form of the sporidia keep this abundantly distinct from *V. epigæa* and *elæina* or *Pyrenothea leucocephala*, whilst the presence of the apothecia prevents its confusion with a Lepraria.

Mr. Borrer (*in lit.* 1850) says, "not *V. trachona*, E. Bot. Suppl. which I suppose to be Acharius's, and like *V. lithina*, Tayl." (the *Pyrenothea lithina* of this work.)

24. V. CONCINNA, *Borr.* Sporidia in asci 8, oblong, margined, pale. Plate XXII. fig. 3.

VERRUCARIA CONCINNA, *Borr.* E. Bot. Suppl. 2623, fig. 1. (1830.)
— — *Hook.* Br. Fl. ii. 152.

Ireland; Teesdale; and Sussex Downs! *Mr. Borrer.*

On Maze Beck, Westmoreland! *Mr. W. Robertson, in herb. Borrer.*

The perithecium is dimidiate, very much incurved at, but not subtending the base of the nucleus, which is separated from the stone only by a very thin black tunic or internal lining. The extremely minute blackish dots mentioned in E. Bot. Suppl. as occurring on the thallus, appear under the microscope as little masses of light brown semi-transparent resinous-looking globules, ultimately becoming of a pale bluish-black colour, and semi-opaque. It is presumed these dots are *Spiloma sphærale* of Acharius and Hook. Br. Fl., but surely rather a fungus than a lichen.

The peculiar incurved perithecium keeps this distinct from both *V. subalbicans*, *rupestris*, and *immersa*; the sporidia from *V. Dufourii*.

†† *Inner tunic pale, not black.*

25. V. Dufourii, *D.C.* Sporidia in asci 8, broadly oblong, uniseptate, granulate, pale. Plate XXII. fig. 4.

Verrucaria dufourii, *D. C.* Fl. Fr. ed. 2. ii. 318. (1805.)
— — *Fries*, L. Ref. 433.
— — *Borr.* E. Bot. Suppl. 2791.
— — *Tayl.* Fl. Hib. pt. ii. 92.
Verrucaria pyrenophora. *Ach.* L. Univ. 285 (1810); Syn. 94.

Cheddar! *Mr. Borrer.*

This and *V. epipolæa* have the largest apothecia amongst the saxicolar Verrucariæ. The *perithecium* is of a thick clumsy shape in section, deeply depressed at the summit, incurved at the base. *Nucleus* pale brown, the asci covering the basal portion, above which is frequently a vacant space separating them from short minute filaments fringing the upper portion; the inner tunic is darker brown and envelopes the nucleus. The *sporidia* are large, ovate probably from compression, since they not unfrequently are seen also of a regular elliptical or oblong form, the internal granular contents large and visible through the pale outer membrane.

The spreading base of the perithecium in *V. epipolæa*, *V. subalbicans*, and *V. rupestris*, with the uniseptate hyaline sporidia in the former, and the black inner tunic of the second, prevent those plants from being mistaken for *V. Dufourii*.

26. V. LINEARIS, *nov. sp.* . Sporidia in asci 8, linear, rounded at the extremities, triseptate, pale yellow. Plate XXIII. fig. 1.

On the same stone with specimens of *V. Dufourii*, from Cheddar! *in herb. Borrer.*

This little plant which, it is believed, has hitherto been overlooked, will be found represented in the plate of *V. Dufourii* in *E. Bot. Suppl.* 2791. It has a thallus similar in structure and colour to that of *V. Dufourii;* the *apothecia* similarly scattered, but very minute, nearly perfectly hemispherical, somewhat truncate or flattened on the summit, slightly immersed by their bases; *perithecium* in section thick and clumsy, black, incurved at the base; *nucleus* pale, whitish, separated at the base from the stone by a pale tunic. The *sporidia* are very different in form from any thing I have observed in the other British Verrucariæ.

* * *Perithecium neither incurved nor spreading at the base.*

† *Inner tunic black.*

27. V. UMBRINA, *Ach.* Sporidia in asci 8, oblong, margined, pale, Plate XXIII. fig. 2.

LICHEN UMBRINUS, *Ach.* Prod. 14. (1798.)
— — *Sm.* E. Bot. 1499.
VERRUCARIA UMBRINA *a. Ach.* Meth. 122. (1803.); L. Univ. 291.
— — *Fries*, L. Ref. 441.
VERRUCARIA UMBRINA (in part), *Tayl.* Fl. Hib. pt. ii. 93. (1836.)
VERRUCARIA NIGRESCENS (in part), *Hook.* Br. Fl. ii. 155. (1833.)

Sussex! *Mr. Borrer.* Nent Force, Cumberland! *Mr. W. Robertson, in herb. Borrer.*

Thallus thin, uniform, very minutely cracked, at first of a tawny olive, finally dark umber, or nearly black, not unlike an old brown inky stain on the stones; when moistened the areolæ look like minute, smooth, slightly convex tawny scales. *Apothecia* very numerous and crowded, minute, their apices generally protruded from the thallus, hemispherical-conoid, black, somewhat shining. *Perithecium* dimidiate, not spreading at the base; nucleus white when moist, enclosed in a thin, dark brown, inner tunic.

The above characters will readily distinguish it from other species with which it has hitherto been confounded. *V. umbrina* locates itself on the stones in and about fresh water lakes and streams, when it assumes much of the *general* appearance of *V. maura:* but the specimens I have seen in this apparently very old state are so friable as to render all attempts at examination hopeless, and without result. *V. maura* always affects the rocks or pebbles on the sea shore, and is at once recognised by the different nature and elevato-punctate appearance of the thallus.

28. V. CODONOIDEA, *nov. sp.* Sporidia in asci 8, linear, narrowed and rounded at each extremity, triseptate, pale-yellow. Plate XXIII. fig. 3.

Haughmond Hill, Shropshire! Craig-y-Rhiw, parish of Oswestry, Shropshire!

Thallus a mere film, scarcely discernible from the rock upon which it grows. *Apothecia* hemispherical, papillate, prominent, very minute, dark-brown, resembling the little bell of a clock in shape. *Perithecium* dimidiate; nucleus white, enveloped in a very thin black or dark brown tunic.

Apparently distinct from *V. margacea*, in the size and structure of the perithecium. Similar in general appearance, but very much smaller, to states of *V. mutabilis*, from which, moreover, the sporidia separate it.

29. V. SPRUCEI, *Ch. Bab.* Sporidia in asci 8, large, broadly linear-oblong, triseptate, white. Plate XXIII.

Specimen labelled "*V. papillosa*, Ach. ? variety with tubercles more denuded. Barnaghee Mountain, 1837"! *Dr. Taylor, in herb. Borrer.* (See Plate XXIII. fig. 4.) Nent Force, Cumberland! *Mr. Robertson, in herb. Borrer.* (See Plate XXIII. fig. 5.)

Thallus effuse, subtartareous, thin, continuous, smoothish, sometimes slightly cracked, pale yellowish-brown, with a green layer underneath the surface. *Apothecia* very prominent, hemispherical, black, slightly polished and shining, with a depressed pore on the summit. *Perithecium* scarcely immersed at the straight base; nucleus white, enveloped in a thin, black or dark-brown tunic, the colour varying in intensity, sometimes paler, as in the Irish specimens, black in the Cumberland and Pyrenean specimens. *Sporidia* very large, white, broadly linear-oblong, more or less slightly tapered at the ends, sometimes obovate, sometimes broader and oblong. Identical with specimens amongst Mr. Spruce's collections in the Pyrenees, gathered on "Mount Gorsi prope les Eaux Bonnes," and named V. Sprucei, by the Rev. Churchill Babington. (See Plate XXIII. fig. 6.)

†† *Inner tunic pale.*

30. V. PAPILLOSA. *Ach.* Sporidia in asci 8, oval, margined, pale-coloured. Plate XXIV. fig. 1.

VERRUCARIA PAPILLOSA, *Ach.* L. Univ. 286.

Specimen named "*V. papillosa*, Ach. ?" from Dunkerron Mountain! *Dr. Taylor, in herb. Borrer.*

Thallus effuse, subtartareous, thin, continuous or minutely rimose, surface rugulose, pale greyish-brown. *Apothecia* often covered by the thallus except their apex, sometimes merely encircled by it at their base, and some-

times almost completely denuded. *Perithecium* nearly hemispherical, depressed on the summit, immersed slightly at the base; nucleus white, enclosed in a brown inner tunic, the colour varying in intensity, sometimes paler, sometimes darker.

31. V. LUCENS. *Tayl.* Sporidia in asci 8, of an elongated fusiform shape, 7-septate, pale yellow. Plate XXIV. fig. 2.

VERRUCARIA LUCENS, *Tayl.* Fl. Hib. pt. ii. 257. (1836.)

Blackwater bridge, Co. Kerry! *Dr. Taylor, in herb. Borrer.*

The sporidia separate this from *V. plumbea*, which it is said to assimilate by the colour of the thallus.

32. V. MUTABILIS, *Borr. MSS.* Sporidia 8 in asci, oblong, pale, minute. Plate XXIV. fig. 3.

LICHEN ACROTELLUS, *Sm.* E. Bot. 1712. (1807.)
VERRUCARIA STRIATULA β. ACROTELLA, *Hook.* Br. Fl. ii. 155. (1833.)
VERRUCARIA ACROTELLA, *Tayl.* Fl. Hib. pt. ii. 94. (1836.) (exclude the Acharian synonymes from all, of which Mr. Borrer has doubts.)

Sussex! *Mr. Borrer.* Wrekin, Shropshire! Craig Breidden, Montgomeryshire!

The peculiar warm-umber hue of the thallus, very different when contrasted from the dull-inky-brown of *V. umbrina*; the minute, scattered, but very numerous, round, almost perfectly hemispherical apothecia, not unfrequently polished and shining; and the dimidiate perithecium, enclosing a white nucleus, in a pale scarcely discernible tunic, apparently form the characteristics of this plant. It may be traced, I think, from the scattered apothecia denuded of thallus, published in *E. Bot.* as *acrotella*, through states in which the thallus is a mere film, or oily looking stain, to one in which the thallus becomes nearly

as thick and consistent as that of *V. umbrina*, but differing from the rimulose thallus of that plant, in being perfectly continuous and entire. In very aged and decaying specimens the thallus becomes blackened, very minutely cracked, rugged and friable.

The denuded state of this plant must not, however, be confounded with *V. codonoidea*, in which the denuded or film-like thallus, and apothecia half the size or less, are at first sight similar. The different sporidia separate them.

33. V. IRRIGUA, *Tayl.* Sporidia in asci 8, fusiform, triseptate, pale yellow. Plate XXIV. figs. 4 & 6.

VERRUCARIA IRRIGUA, *Tayl.* Fl. Hib. p. ii. 95. (1836.)

Dargle river, Co. Wicklow! *Dr. Taylor, in herb. Borrer.* Arddog! *Rev. T. Salwey, in herb. Borrer.* Rhaidyr Mowddach! *Rev. T. Salwey.*

Notwithstanding that the perithecium is more spreading at the base than in *V. erysiboda*, Fl. Hib. 98 (specimen examined from Carig, Kerry! *Dr. Taylor, in herb. Borrer.* see Plate XXIV. fig. 6), yet the sporidia being precisely similar, I incline to think that they may be states of the same species. *V. rubiginosa* (Fl. Hib. 94) is also probably identical, but I have not had an opportunity of examining any specimen. The red coloured perithecium is remarkable in all. I adopt the name *irrigua* for the species, merely because it stands first in Dr. Taylor's work.

* * * *Perithecium spreading at the base.*

† *Inner tunic black.*

34. V. SUBALBICANS, *nov. sp.* Sporidia in asci 8, elliptical or oblong, margined, pale yellow. Plate XXV. fig. 1.

Sussex! *Mr. Borrer.*

Thallus crustaceous, of a greyish-white colour, continuous and crumbly, with minute green dots scattered on the surface and throughout its substance. *Apothecia* very numerous and crowded, large, prominent, black, when perfect nearly of a true conical shape, the apex perforated and dilated, frequently more hemispherical, more or less rugged and pruinose. *Perithecium* dimidiate, decidedly and conspicuously spreading at the base, not subtending the base of the white nucleus, which is enveloped in a tough black inner tunic.

35. V. IMMERSA, *Hoffm.* Sporidia in asci 8, linear-oblong, margined, uniseptate, hyaline. Plate XXV. fig. 2.

VERRUCARIA IMMERSA, *Hoffm.* Pl. Lich. t. 12, f. 2-4. (1789.)
— — *Pers.* in Ust. Ann. Bot. st. 7.
— — *Tayl.* Fl. Hib. pt. ii. 90.
VERRUCARIA RUPESTRIS, *Schrad.* Spicil. 109, t. ii. f. 7. (1794.)
— — *Hook.* Br. Fl. ii. 152.
— *a.* CALCISEDA, *Fries*, L. Ref. 436. (in part) (1831.)

Sussex! *Mr. Borrer.* Craigforda, near Oswestry, Shropshire! *Rev. T. Salwey.* Craig-y-rhiw, parish of Oswestry, Shropshire!

Mr. Borrer's herbarium contains authentic specimens! labelled respectively, "*V. Schraderi*, Schleicher," "*Lecidea lithyrga*, Schleicher," *Verrucaria Schraderi var. foveolata* Schærer," and "*V. Schraderi*, Ach., *Gemmi*, Schærer." All these on examination and dissection seem to be identical. They have an apothecium which it is very difficult to decide, whether it should most correctly be called entire or dimidiate. I incline, however, to conclude that its true structure is dimidiate, from the following circumstances, strengthened as they are by a specimen! in the same herbarium, in all external appearance identical, "*sent by Dr. Swartz to Mr. Turner as Verr. Schraderi*," in which the perithecium is decidedly dimidiate, small and flat, black and carbonaceous, and the inner tunic pale brown.

In this species it would seem that the carbonaceous dimidiate *perithecium* is larger or smaller in extent according to the size and age of the apothecium, either reduced to an almost speck when closely surrounded with the thallus, in which it is wholly immersed, and then not unaptly resembles the apothecium of a *Sagedia*, or of *V. epigæa*, or *Hookeri*; or of a larger size when the apothecium is found filling minute open cavities in the stone, when the perithecium is thick and flattened, contracted so as to fit the cavity. The inner tunic also differs in thickness, being either very thin, or very nearly equalling the thickness of the perithecium, from which it is then rather difficult to distinguish it. In all cases, however, it is tough and membranous, and so capable of being distinguished from the hard rigid carbonaceous perithecium. The *apothecia* are sunk in small cavities in the stone, and vary in size, being either large and scattered, or minute and densely crowded. These forms may be traced in gradual transition on the same specimen; when on separate specimens, as is frequently the case, their general appearance is very dissimilar, and, at first sight, they might be supposed to be distinct plants. In an advanced state, when the cavity of the stone becomes enlarged, and the apothecium loosened, it would seem that the carbonaceous dimidiate perithecium becomes friable, and falls partially or entirely away, leaving the thick tough inner tunic remaining, concave at the top, surrounded or margined with the remains of the perithecium. In this condition the apothecium would be pronounced decidedly entire. Not unfrequently the perithecium and the upper portion of the tunic falls off, leaving the lower portion of the now open tunic remaining, which finally falls out of the cavity in the stone. The nucleus is variable in colour, when dry darker or paler brown, when wetted pale and hyaline. Sporidia in asci 8, linear-oblong, more or less slightly tapered towards each extremity, uniseptate, hyaline. The thallus varies in colour from a chalky whiteness to a pale dirty yellow, and a grey ashey white.

Not to be confounded with *Lecidea albo-cærulescens* β. *immersa* (Fries, L. Ref. 296), *Lichen immersus, E. Bot. t.* 193, which grows on the same description of rocks, not unfrequently together, and which it resembles in general external appearance. *Lichen immersus*, however, is a true Lecidea. (See Plate XXIV. fig. 5.)

36. V. MAURA, *Ach.* Sporidia in asci 8, oblong, margined, pale. Plate XXV. fig. 3.

VERRUCARIA MAURA, *Ach.* Meth. Suppl. 19. (1803); L. Univ. 291; Syn. 95.
— — *Fries*, L. Ref. 442.
— — *Hook.* Br. Fl. ii. 154.
— — *Tayl.* Fl. Hib. pt. ii. 93.
LICHEN MAURUS, *Sm.* E. Bot. 2456. (good) (1812.)

Dunbar! *Mr. Borrer.* Barmouth! *Rev. T. Salwey.*

Thallus thick, very compact, of a very dark reddish-black, coarsely cracked, smooth, somewhat polished and shining, the plane of the areolæ covered with very minute papillæ, or elevated points, scarcely visible to the naked eye, their margin somewhat raised into a very narrow, sharp, elevated rim. Young entire plants, having the margins of the thallus visible, have very much the appearance of a thick olive-black oily substance dropped or poured out upon the rock, and are frequently uniform, or without cracks. *Apothecia* scattered, not very numerous, tolerably large, hemispherical, entirely immersed in and covered by the thallus, their situation only recognisable by their elevating the thallus, and their distinct large pore. *Perithecium* spreading widely at the base, dimidiate; nucleus white, enveloped in a black tunic which separates it from the rock. Sometimes a dark substratum, or portion of the thallus, intervenes between the nucleus and the rock, causing the perithecium at first sight to appear entire.

†† *Inner tunic pale.*

37. V. RUPESTRIS, *Schrad.* Sporidia in asci 8, oblong, margined, pale yellow. Plate XXV. fig. 4.

LICHEN SCHRADERI, *Ach.* Prodr. 13. (1798.)
— — *Sm.* E. Bot. 1711?
VERRUCARIA SCHRADERI. *Ach.* Meth. 114. (1803.); L. Univ. 284; Syn. 93.

Sussex! *Mr. Borrer.*

An authentic specimen! of "*V. rupestris*, from Dr. Schrader," in Mr. Borrer's herbarium, presented the following characters: *Thallus* thin, a mere film, very pale olive-brown; *apothecia* prominent, immersed only at the base, hemispherical, with a small depression on the summit, black, scattered; *perithecium* dimidiate, more or less spreading at the base; inner tunic brown, paler or darker; nucleus brown, white when wet; sporidia oblong.

Mr. Borrer's collection contains an extensive series of specimens, apparently identical with Dr. Schrader's specimen above mentioned, in which some variations are noticeable.

On flint:—the *thallus* was of a thicker crustaceous consistence, irregularly raised into small warts, or irregular rugged elevations, slightly and irregularly cracked, having altogether a scaly appearance, and investing the very base of the apothecia with a sort of pseudo-thallodal margin or rim, yellowish-brown. *Apothecia* larger, more numerous and prominent, hemispherical, black. *Perithecium* dimidiate, more or less spreading at the base; inner tunic very thin and delicate, brown, sometimes almost indistinguishable; nucleus white; sporidia oblong, pale.

On sandstone:—similar, but the *thallus* paler in colour, and more crumbly in appearance.

On chalk:—the *thallus* either cream-coloured and scaly, crustaceous, or of a dirty pale-olive-grey tinge, thin, and

filmy, dotted all over with minute olive-grey dots, probably arising from the outer layer being rubbed off, and disclosing the substratum of green dots.

Abundantly distinct from *V. immersa*.

38. V. PATULA. Sporidia in asci 8, oblong, margined, granulate, pale-brown. Plate XXVI. fig. 1.

Sussex! *Mr. Borrer.*

Thallus white, crustaceous; *apothecia* imbedded in the thallus, the apex only visible, half the size of *V. muralis*, with which it is possibly often confounded, being found growing on mortar, &c., the habitats of that plant. *Perithecium* dimidiate, more or less spreading at the base; nucleus pale brown, enveloped in a pale brown inner tunic.

The entire perithecium and uniseptate sporidia in *V. muralis* distinguish it from this plant, which is found in similar localities. Doubtful if distinct from *V. rupestris*, Schrad., and introduced here for the purpose of ascertaining its difference or identity by further examinations.

39. V. EPIPOLÆA, *Ach.* Sporidia in asci 8, oblong, uniseptate, pale-yellow. Plate XXVI. fig. 2.

VERRUCARIA EPIPOLÆA, *Ach.* L. Univ. 285. (1810); Syn. 95.
— — — *Borr.* E. Bot. Suppl. 2647, fig. 3.
— — — *Hook.* Br. Fl. ii. 154.
— — — *Tayl.* Fl. Hib. pt. ii. 92.
VERRUCARIA CONOIDEA, *Fries*, L. Ref. 432. (1831) (in part.)

Limestone rocks, Oswestry, Shropshire! *Rev. T. Salwey.* Craig-y-Rhiw, parish of Oswestry, Shropshire!

The widely spreading base of the perithecium and its sporidia separate this from *V. Dufourii;* the former character and its place of growth from *V. gemmata;* its pale inner tunic and uniseptate sporidia from *V. subalbicans;* and its dimidiate perithecium keeps it distinct from *V. muralis;* whilst the sporidia sufficiently distinguish it from *V. rupestris* and *V. patula.*

40. V. MARGACEA, *Wahl.* Sporidia in asci 8, linear, rounded at each extremity, triseptate, dark-brown. Plate XXVI. fig. 3.

THELOTREMA MARGACEUM, *Wahl.* in Ach. Meth. Suppl. (1803).
VERRUCARIA MARGACEA, *Wahl.* Fl. Lapp. 465. (1812); Fl. Suec. 872.
— — *Fries*, L. Ref. 440.
PYRENULA MARGACEA, *Ach.* L. Univ. 315, t. 5, f. 3. (Apoth.) (1810); Syn. 127.
VERRUCARIA SUBMERSA, *Borr.* E. Bot. Suppl. 2768. (1833.)

Sussex! *Mr. Borrer.*

The peculiarly expanded circumference of the perithecium, visible through the thin thallus, distinguishes this species at first sight. In an old state the prominent portion of the apothecium falls off, leaving the expanding circumference remaining as a black ring.

Mr. Borrer, who has verified the above synonyms, writes (*in lit.* 1850): "*V. submersa* is, I am much inclined to believe, *V. margacea*, Wahl., and if so it ought to bear this name. I have no means of judging whether Fries is right in referring *V. hydrela* and *V. chlorotica*, Ach. to the same species. *V. hydrela* of Mougeot and Nestler's Crypt. Vosges. 952 belongs to ours. Young specimens of this, in their native streams, are bright green, and quite diaphanous. I doubt whether you have seen 'adulta et rite explicata' specimens such as Fries describes."

Schærer's specimen, No. 523, of *V. chlorotica*, Ach. is a different plant.

41. V. NIGRESCENS, *Pers.* Sporidia in asci 8, oblong, margined, pale. Plate XXVII. fig. 1.

VERRUCARIA ANTIQUITATIS, *Flörke*, in Magaz. f. d. Neuest Enddeck in d. Naturk. 1807, i. p. 17.
VERRUCARIA NIGRESCENS, *Pers.* ap. Ust. in Ann. de Bot. st. 14. 36.
— — *Hook.* Br. Fl. ii. 155 (in part.) (1833.)
VERRUCARIA UMBRINA β. NIGRESCENS, *Ach.* L. Univ. 291. (1810.)
PYRENULA NIGRESCENS, *Ach.* Syn. 126. (1814.)

Sussex! *Mr. Borrer.*

Thallus tolerably thick, crustaceous, of a tawny-black, cracked, with an uneven, loose, crumbly surface, raised into low, warty, elevations around the apothecia. *Apothecia* large, nearly double the size of those of *V. umbrina*, more or less numerous and crowded, hemispherical, their apices generally visible (though sometimes covered by the thallus), their basal circumferences surrounded by the scaly elevations of the thallus. *Perithecium* dimidiate, spreading at the base, the interstices between the perithecium and the tunic filled up with a dark substance; nucleus white, when moist, inclosed in a dark brown inner tunic, which separates it from the rock.

42. V. ELÆINA, *Borr.* Sporidia in asci 8, linear-oblong, uniseptate, pale, hyaline. Plate XXVII. fig. 2.

LICHEN VIRIDULUS, *Sm.* E. Bot. 2455. (*excl. syn.*) (1812.)
VERRUCARIA ELÆINA, *Borr.* under E. Bot. Suppl. 2623, fig. 2. (1830.)

Sent from Ireland by Miss Hutchins! *Mr. Borrer.*

The perithecium is singularly flattened and spread out at the circumference, and is bent in very acutely at the base, nearly enveloping the nucleus, except a small round space in the very centre of the base.

The specimens of *V. Gagei*, Borr.! (see Plate XXVII. fig. 3) and *V. Harrimanni*, Ach.! (see Plate XIX. fig. 4) *in herb. Borrer*, showed only on section a black flat perithecium, with a roundish yellow spot underneath, no trace of asci or sporidia being discernible.

V. lithina, of Fl. Hib. 92, (which is not identical with *V. lithina*, Ach. according to a specimen from Swartz *in herb. Borrer*,) and *V. mollis*, Fl. Hib. 97, are referable to the genus *Pyrenothea*.

V. circumscripta, Fl. Hib. 96, belongs to the genus *Sagedia*; and *V. fissa*, Fl. Hib. 95, to *Endocarpon*. *V. rubiginosa*, Fl. Hib., I have never seen specimens of.

C. Terricolæ.

43. V. epigæa, *Ach.* Sporidia in asci 8, of an irregular obovate form, hyaline. Plate XXVII. fig. 4.

Sphæria epigæa, *Pers.* Syn. Fung. App. 27.
Verrucaria epigæa, *Ach.* Meth. 123. (1803); L. Univ. 295; Syn. 96.
— — *Fries*, L. Ref. 431.
— — *Hook.* Br. Fl. ii. 155.
— — *Tayl.* Fl. Hib. pt. ii. 96.
Lichen terrestris, *Sm.* E. Bot. 1681. (1806.)

Sussex! *Mr. Borrer.* Hay Coppice, Hertfordshire! *Rev. T. Salwey.* Twycross, Leicestershire! *Rev. A. Bloxam.*

The *apothecium* in this plant is at first pale, finally black, either globose, or somewhat ampullæform, the apex in all states being surmounted by a carbonaceous, black, stout, nearly flat and slightly dilated *perithecium*, perforated with a simple pore. Nucleus white and hyaline.

The form and structure of the apothecium in this and the following, assimilate very closely with the characters of Fries's genus *Sagedia*.

44. V. Hookeri, *Borr.* Sporidia in asci 8, consisting of two cone-like bodies set base to base, their sides slightly excavated, triseptate, or 5-septate? dark bright brown. Plate XXVII. fig. 5.

Verrucaria hookeri, *Borr* E. Bot. Suppl. 2622, fig. ?. (1839.)
— — *Hook.* Br. Fl. ii. 155. (1833.)

Ben Lawers! *Mr. Borrer.*

I am uncertain about the number of the septa in the sporidia. When the contents of the sporidium are discharged, only one septum is visible, as at (*a*). Some of the sporidia have the 3 septa, as at (*b*), and I incline to

think this the normal state; although the greater number of them have apparently 5 septa as at (*c*), but it is doubtful whether the appearance of additional septa does not arise from a collapse of the contents.

The form of the perithecium here still more closely approaches that characteristic of Sagedia.

Tribe IV.—LIMBORIEÆ, *Fries.*

Apothecium round; proper receptacle carbonaceous, closed, ultimately dehiscing variously; nucleus somewhat waxy, becoming rigid. Thallus crustaceous.

Genus I.—Pyrenothea, *Fries.*

Perithecium round, carbonaceous, closed, perforated with a simple opening, protruding a globular nucleus, which at length falls to pieces, ultimately dehiscent, spread out, evacuated. Thallus crustaceous.

The great feature in this genus is, that the sporidia are free, and not contained in asci, but are conglomerated together, as in many fungi, and fall to pieces or dissolve on the application of moisture, frequently issuing from the perithecium in a continuous stream or cloud.

1. P. leucocephala, *Fries.* Sporidia not contained in asci, free, innumerable, of an irregular, gibbous, linear-oblong form, pale yellow. Plate XXVIII. fig. 1.

Verrucaria leucocephala, *Ach.* Meth. 116. (1803;) L. Univ. 286.
— — *Borr.* E. Bot. Suppl. 2642, fig. 2.
— — *Hook.* Br. Fl. ii. 152.
— — *Tayl.* Fl. Hib. pt. ii. 90.
Pyrenula leucocephala, *Ach.* Syn. 126. (1814.)
Cyphelium leucocephala, *Ach.*, in Stockholm Trans. (1817.) 226. t. 8. f. 7.
Pyrenothea leucocephala, *Fries*, L. Ref. 450. (1831.)

Sussex! (with patellulæ) *Mr. Borrer.* Park Sychart! (with patellulæ) *Rev. T. Salwey.* Spec. exsicc. *Bohler's Brit. Lich.*

The patellulæ constituting the var. β. *amphibola* (Ach. Syn. 126 (1814). * *Lecidina*, Fries., L. Ref. 150. (excl. syn.) E. Bot. Suppl. l. c.) on dissection, exhibit a black receptacle bearing a pale asciferous disk, covered with a whitish pruinose veil. The asci contain 8 sporidia in each, of a slender fusiform or acicular shape, triseptate, pale (see Plate XXVIII. fig. 2). It is not known to what lichen these patellulæ really belong. They are in some respects not dissimilar from those of *Lichen Griffithii* (E. Bot. 1735), but in that plant the sporidia are oblong, uniseptate (see Plate XXVIII. fig. 4). Fries. (*l. c.*) quotes as synonymous *Lichen abietinus*, Ach. v. a. h. 1795, *t.* 5, *f.* 7, and E. Bot. 1682, but in the specimen of this in Bohler's Brit. Lich. although the patellulæ are very similar, yet the sporidia differ, being broadly and obtusely fusiform, 5-septate, pale yellow, (see Plate XXVIII. fig. 3).

2. P. RUDIS. Sporidia not contained in asci, free, very minute, innumerable, linear, rounded at each extremity, slightly curved, pale-yellow. Plate XXVIII. fig. 5.

VERRUCARIA RUDIS, *Borr.* E. Bot. Suppl. 2637, fig. 2. (1830.)
— — *Hook*, Br. Fl. 151.

Original specimen figured in *E. Bot. Suppl.* in *herb. Borrer!*

Nucleus, brownish when dry, gelatinous and pale when moistened. Perithecium dimidiate.

The colour and texture of the crust distinguish this from *P. niveo-atra;* the sporidia from *P. leuco-cephala;* and the structure of the perithecium, and form of the sporidia from *Verrucaria biformis* and *V. olivacea.*

Verrucaria rudis pseudo-leuco-cephala, Borr., scarcely

differs, except in the more prominent apothecia, elongated at the base also: the sporidia are free and similar (see Plate XXVIII. fig. 6).

3. P. APHANES. Sporidia not contained in asci, free, very minute, innumerable, linear-oblong, rounded at each extremity, pale-yellow. Plate XXVIII. fig. 7.

VERRUCARIA APHANES, *Borr.* E. Bot. Suppl. 2642, fig. 1. (1830.)
— — *Hook.* Br. Fl. 151.

Original specimen figured in *E. B. Suppl. in herb. Borrer!*

Differs from *P. leuco-cephala* in the form of the sporidia, but I am at a loss to distinguish it from *P. rudis*, except it prove to be a constant character that the sporidia are quite straight, not curved, and somewhat stouter. Most probably they may be states of the same plant.

4. P. NIVEO-ATRA. Sporidia not contained in asci, free, very minute, innumerable, linear-oblong, rounded at each extremity, pale-yellow. Plate XXIX. fig. 1.

VERRUCARIA NIVEO-ATRA, *Borr.* E. Bot. Suppl. 2637, fig. 1. (1830.)
— — *Hook.* Br. Fl. 151.

Sussex! *Mr. Borrer.* Oswestry, Shropshire! *Rev. T. Salwey.* On ash at Red Hill, near Shrewsbury, Shropshire!

The structure of the perithecium, and form of the sporidia, readily distinguish this from *Verrucaria biformis.*

5. P. MOLLIS. Sporidia not contained in asci, free, innumerable, very minute, linear-oblong, rounded at each extremity, yellow. Plate XXIX. fig. 2.

VERRUCARIA MOLLIS, *Tayl.* Fl. Hib. pt. ii. 97. (1836.)

Carig, Co. Kerry! *Dr. Taylor, in herb. Borrer.*

Perithecium entire.

6. P. LITHINA. Sporidia not contained in asci, free, innumerable, very minute, linear-oblong, rounded at each extremity, yellow. Plate XXIX. fig. 3.

VERRUCARIA TRACHONA, *Ach.* Meth. Suppl. 16. (1803;) L. Univ. 286; Syn. 96.
— — *Borr.* E. Bot. Suppl. 2647, fig. 1.
VERRUCARIA LITHINA, *Tayl.* Fl. Hib. pt. ii. 92. (*excl. syn.*)

Derriquin, Co. Kerry! *Dr. Taylor, in herb. Borrer.* and *Salwey.*

This is not identical with the true *Verrucaria lithina*, Ach., of which there is an authentic specimen from Swartz, in Mr. Borrer's herbarium! It has the perithecium dimidiate, and only two sporidia in each ascus, very large, oblong, triseptate, and consequently referable to the tartareous section of the genus *Endocarpon.*

In 1849, I collected in the "great gulley," on Craig Breidden, Montgomeryshire, specimens which had apothecia and sporidia identical with those of *P. lithina*, but the thallus was much less compact and more crumbly, than in Dr. Taylor's specimens, and of a green colour.

6. P. LUTEA, *nov. sp.* Sporidia not in asci, free, curved, of a linear shape, finely tapered at each extremity, pale-yellow. Plate XXIX. fig. 4.

On bark of trees, Gopsal, Leicestershire! *Rev. A. Bloxam.*

Thallus compact, smooth, yellow, cracked into minute areolæ, the cracks disclosing a pale brown substratum underneath. Apothecia very numerous and crowded, generally one in each areola, dark-brown, hemispherical, depressed. Perithecium dimidiate, thick and clumsy. Nucleus white, when moistened.

Intermixed with this, grew *Opegrapha* ——— ? in which the sporidia were in asci, 8, fusiform, 4-septate.

7. P. SULPHUREA, *nov. sp.* Sporidia not contained in asci, free, innumerable, minute, linear-oblong, rounded at each extremity, yellow. Plate XXIX. fig. 5.

On sandstone rocks, Niton, Isle of Wight! *Mr. Borrer.*

Thallus crustaceous, pale-olive, minutely verrucoso-rugose, cracked, becoming denuded of the cortical layer, and then covered with a pale sulphur-coloured powdery efflorescence, just as if flour of brimstone had been scattered over the rock. Apothecia numerous, rather large, scattered, immersed in the thallus, the black apex only visible. Perithecium dimidiate, straight at the base. Nucleus, pale. Can this be a state of *P. lithina*, (*Verr. lithina, Tayl.* Fl. Hib.)?

Cliostomum corrugatum, Fries. (L. Ref. 455, 1831,) is, undoubtedly, a fungus parasitic on the crust of *Lecidea Ehrhartiana*, Ach. (*Lichen Ehrhartianus*, E. Bot. 1136). Observation proves that the sporidia of *Cliostomum corrugatum* are not contained in asci, but are free, innumerable, very minute, linear-oblong, pale-yellow (see Plate XXX. fig. 1.) whilst those of *Lecidea Ehrhartiana* (see Plate XXX. fig. 2.) are very minute, broadly linear, rounded at each extremity, uniseptate, pale-yellow, 8 in each ascus; consequently the plants have nothing in common. Fries considers *Lecidea Ehrhartiana* as the apothecia of *Parmelia varia*, (*Lichen varius*, E. Bot. 1666,) parasitic on the crust of *Cliostomum corrugatum*, and makes it in consequence his var. ζ *parasitica* of *Parmelia varia*, (L. Ref. 159), but this is disproved by the sporidia of *Parmelia varia* being of a regular elliptical form, margined, and filled with round granules. (See Plate XXX. fig. 3.)

The specimens examined were from Livermere, Suffolk! and near Cotteshall! Mr. Borrer remarks, *in lit.* 1850,

"I never saw patellulæ with the *Cliostomum* on Sussex specimens, whilst none of the Norfolk and Suffolk ones are without."

Genus II.—Strigula, *Fries.*

Perithecium sub-globose, collapsing, at length opening by an irregular fissure, or minute pore. Nucleus at first gelatinous, at length rigid, becoming black and cracking when exposed. Thallus mostly produced beneath the cuticle. Parasitic on coriaceous perennial leaves. *Berkeley, E. B. Suppl.*

1. S. Babingtonii, *Berkeley.* Sporidia in asci 8, subcymbiform, triseptate. Plate XXX. fig. 4.

Strigula Babingtonii, *Berkeley,* E. Bot. Suppl. 2957. (1849.)

On box, Cambridge! *Rev. Churchill Babington.*
On laurel, Gopsall, Leicestershire! *Rev. A. Bloxam.*

Our figures of the sporidia differ from those represented in *E. Bot. Suppl.*, t. c.

ADDENDA.

WHILST these pages were passing through the press, Schærer's 'Enumeratio Critica Lichenum Europæorum,' 8vo. Bern. 1850, came to hand. With a view of bringing down our information to the latest period, I subjoin the synonymy from this work, and intersperse a few corrections and additions relating to the different plants.

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7. *Sphærophoron coralloides, a. laxum.*

Adde syn. *Sphærophorus coralloides*, Schær. Spicil. 242. Enum. 177, tab. vi. f. 4. *b. c.*

8. *Sphærophoron coralloides, β. cæspitosum.*

Adde syn. *Sphærophorus fragilis*, Schær. Spicil. 242. Enum. 176.

9. *Sphærophoron compressum.*

Adde syn. *Sphærophorus melanocarpos*, Schær. Spicil. 243. Enum. 177.

11. *Endocarpon miniatum, a. umbilicatum.*

Adde syn. *Endocarpon miniatum, a. umbilicatum*, Schær. Enum. 232, tab. ix. f. 2, *b. c.*

Endocarpon miniatum, β. complicatum.

Adde syn. *Endocarpon miniatum, β. complicatum*, Schær. Enum. 232.

12. *Endocarpon leptophyllum.*

Adde syn. *Endocarpon miniatum, a. b. leptophyllum*, Schær. Enum. 232.

Endocarpon cuplocum.

Adde syn. *Endocarpon cuplocum*, Schær. Enum. 232.

Endocarpon lætevirens.

Adde syn. *Solorina saccata, b. lætevirens*, Schær. Enum. 232.

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13. *Endocarpon psoromoides.*

Adde syn. *Endocarpon psoromoides*, Schær. Enum. 234.

Endocarpon pulchellum.

Merely referred to in Schær. 'Spicil.' 352, with the observation "Parmeliæ perlatæ forsan initium," but omitted altogether in his 'Enum.'

16. *Endocarpon smaragdulum, a. smaragdulum.*

Adde syn. *Lecanora cervina, β. castanea, c. smaragdula*, Schær. Enum. 55.

β. sinopicum.

Adde syn. *Lecanora cervina, β. castanea, d. sinopica*, Schær. Enum. 55.

δ. rufescens.

Adde syn. *Lecanora cervina, δ. rufescens*, Schær. Enum. 56.

18. *Endocarpon sorediatum.*

Adde syn. *Endocarpon pusillum, γ. pallidum, b. sorediatum*, Schær. Enum. 234.

19. *Endocarpon pallidum.*

Adde syn. *Endocarpon pallidum, γ. pallidum*, Schær. Enum. 234.

Endocarpon lithinum.

Adde syn. *Verrucaria lithina*, Schær. Enum. 219. (excl. Taylor's Irish plant, which is a Pyrenothea.)

20. *Endocarpon fissum.*

This is doubtfully quoted by Schærer in his 'Enum.' 207, as possibly identical with *Segestria umbonata*, (*Segestrella thelostoma*, Fries,) but from which it is *generically* distinct.

Endocarpon isidioides.

Adde syn. *Pertusaria rupestris, β. melanochlora*, Schær. Enum. 228.

22. *Sagedia cinerea.*

Adde syn. *Endocarpon cinereum*, Schær. Enum. 235.

Sagedia fuscella.

Adde syn. *Verrucaria fuscella*, Schær. Enum. 215.

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23. *Sagedia viridula.*

Adde syn. *Verrucaria viridula*, Schær. Enum. 215.

24. *Sagedia aggregata.*

Adde syn. *Opegrapha crassa, α. obscura*, Schær. Enum. 160.

Sagedia circumscripta.

Schærer (Enum. 92) says—"Hujus speciei (*Urceolaria calcarea*) forma rite nondum explicata videtur *Verr. circumscripta*, Tayl., in 'Mack. Hib.' ii. p. 96, ex. specim. in coll. *Salw.*! asservato." An inspection of our Plate VIII. will nullify this remark.

25. *Chiodecton albidum.*

Adde syn. *Chiodecton myrticola, β. Syncesia*, Schær. Enum. 226.

27. *Pertusaria communis.*

Adde syn. *Pertusaria communis*, Schær. Enum. 229.

28. *Pertusaria ceuthocarpa.*

Adde syn. *Pertusaria rupestris, fallax*, Schær. Enum. 227.

29. *Pertusaria fallax.*

Adde syn. *Pertusaria communis, fallax*, Schær. Enum. 229.

Pertusaria melaleuca.

Adde syn. *Pertusaria leioplaca, fallax*, Schær. Enum. 230.

Pertusaria Hutchinsiæ.

Schærer (Enum. 231) says "*Thelotrema Hutchinsiæ*, Borr., in 'E. B. Suppl.,' t. 2652. vel hujus speciei (*Pertusaria glomerata*) formam fallacem offerre vel ad Urceolariam verrucosam pertinere videtur." The sporidia decide its proper arrangement as a Pertusaria.

The description of *Pertusaria glomerata* seems to accord very satisfactorily with Mr. Borrer's Pertusaria, on moss from the highlands of Scotland. (Plate XI. fig. 2.) "*Pert. glomerata*, thallus membranaceo-cartilagineus, albus, tenuissimus, effusus. Apotheciorum verrucæ globulares, agglomeratæ, pleræque uniloculares, circa ostiola majuscula nigricantia depressæ." Schær. Enum. 230. I have had no opportunity of examining his 'Lich. Exsicc.' 120.

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31. *Thelotrema lepadinum.*

Adde syn. *Thelotrema lepadinum*, Schær. Enum. 225, tab. viii, f. 5. *b. c.* (good.)

Thelotrema exanthematicum.

Adde syn. *Thelotrema clausum*, Schær. Enum. 225.

35. *Segestrella thelostoma.*

Adde syn. *Segestria umbonata*, Schær. Enum. 207, excl. the synonymes of *Verrucaria irrigua* and *erysiboda*, Tayl., and *Verr. fissa*, Tayl., which are totally different from each other, and from *Segestrella thelostoma*, as an examination of the authentic specimens in herb. Borrer has shown. *Verr. irrigua* and *erysiboda* are, probably, forms of the same plant, and are united as one species in this work, under *Verr. irrigua*. *Verr. fissa*, Tayl., is an Endocarpon. Schærer's tab. viii, f. 1 does not represent *Segestrella thelostoma* (as figured in E. Bot., and the orig. spec. in herb. Borrer), but I suspect is rather taken from a specimen of *Verrucaria irrigua*, Tayl., gathered by Rev. T. Salwey, at Rhaidyr Mowddach, of which I have a similar one in my own herbarium.

Verrucaria nitida.

Adde syn. *Pyrenula nitida*, Schær. Enum. 212. t. viii. f. 2. *b. c.*

36. *Verrucaria nitida, β. dermatodes.*

Adde syn. *Pyrenula dermatodes*, Schær. Enum. 213.

37. *Verrucaria rhyponta.*

Adde syn. *Verrucaria rhyponta*, Schær. Enum. 220.

Verrucaria biformis.

Adde syn. *Verrucaria biformis*, Schær. Enum. 222.

39. *Verrucaria cinerea.*

Adde syn. *Verrucaria punctiformis*, Schær. Enum. 220. (in part.)

40. *Verrucaria epidermidis.*

Adde syn. *Verrucaria epidermidis*, Schær. Enum. 219. (excl. var. γ. Cerasi.)

Verrucaria epidermidis, β. analepta.

Adde syn. *Verrucaria analepta*, Schær. Enum. 221.

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41. *Verrucaria punctiformis.*

Adde syn. *Verrucaria punctiformis*, Schær. Enum. 220. (in part.)

42. *Verrucaria olivacea.*

Adde syn. *Verrucaria carpinea*, Schær. Enum. 221.

43. *Verrucaria gemmata.*

Adde syn. *Verrucaria alba*, Schær. Enum. 219, tab. viii. f. 3. *b. c.* (excl. syn. Schrad. Spicil., whose figure represents an *entire* perithecium).

44. *Verrucaria lævata.*

Adde syn. *Verrucaria lævata*, Schær. Enum. 217.

45. *Verrucaria plumbea.*

Adde syn. *Verrucaria cærulea*, Schær. Enum. 216. *Verrucaria plumbea*, Bohler's Lich. Brit. No. 81. (good figure.)

46. *Verrucaria muralis.*

Adde syn. *Verrucaria muralis*, Schær. Enum. 218.

47. *Verrucaria gemmifera.*

Schærer (Enum. 118) says, "Hujus speciei (*Lecidea confluens*) forma rite nondum explicata videtur *Verrucaria gemmifera*, Tayl. in Mack. Hib. ii. 95, ex specimine in coll. *Salw.!*" Our Plate XX will show its true structure.

48. *Verrucaria peripherica.*

Adde syn. *Lecanora rimosa*, *α. d, lactea*, Schær. Enum. 71.

Verrucaria umbrosa.

Adde syn. *Opegrapha saxatilis*, *β. Tesserata*, Schær. Enum. 159. The sporidia show that it has nothing in common with *Opeg. tesserata*, D. C., or *O. saxatilis*, D. C. (*calcarea*, E. Bot.)

Verrucaria macrostoma.

Adde syn. *Verrucaria macrostoma*, Schær. Enum. 214. Through the kindness of my friend, the Rev. Churchill Babington, I have examined an authentic specimen of this plant gathered in the south of France, received by him from M. Montagne. It is quite identical with ours

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49. *Verrucaria polysticta.*

Adde syn. *Verrucaria polysticta*, Schær. Enum. 216.

50. *Verrucaria concinna.*

Whilst these pages were printing, I have examined an authentic specimen of *Verrucaria Dufourii*, D. C., obtained by the Rev. Churchill Babington from M. Montagne. It proves to be identical with our British *Verr. concinna*, and with specimens gathered by Mr. Spruce in the Pyrenees. Consequently our *V. concinna* must, in future, bear the name of *Verr. Dufourii*, D. C., and *Verrucaria Dufourii*, E. Bot. Suppl. t. 2791, will be appropriately designated *Verrucaria Borreri.*

The synonymy will stand thus :—

Verrucaria Dufourii, D. C.

Verrucaria Dufourii, D. C., Fl. Fr. ed. 2, 2, 318. (1805.)
— — Fries, L. Ref. 432.
— *concinna*, Borr., E. Bot. Suppl. 2623, fig. 1. (1830.)
— — Hook, Br. Fl. ii. 152.
— — Leight., Brit. Ang. Lich. 50.
— *epipolæa*, β. *concinna*, Schær. Enum. 218. (1850.)

Verrucaria Borreri.

Verrucaria Dufourii, Borr., E. Bot Suppl. 2791. (1831.)
— — Tayl., Fl. Hib. pt. ii. 92.
— — Schær., Enum. 218. (in part.)
— — Leight., Brit. Ang. Lich. 51.

52. *Verrucaria umbrina.*

Adde syn. *Pyrenula umbrina*, Schær. Enum. 210.

54. *Verrucaria Sprucei.*

May 1, 1851. Mr. Borrer this day permitted me to examine an authentic specimen of *Verrucaria pyrenophora*, Ach., received from Schleicher, who, according to 'Lich. Univ.' furnished Acharius with the species. The sporidia proved it to be identical with *V. Sprucei*, Ch. Bab., which name must therefore give place to *V. pyrenophora*, Ach.

The synonymy will stand thus :—

Verrucaria pyrenophora, Ach.

Verrucaria pyrenophora, Ach., L. Univ. 285. tab. 4, fig. 3. (1810.) Syn. 94.
Verrucaria Dufourii, Schær. Enum. 218 (in part). (1850.)
— *Sprucei*, Leight., Brit. Ang. Lich. 54. tab. 23. (1851.)

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54. *Verrucaria papillosa.*

I have in Plate XXIV figured the sporidia as they occurred in the specimens before me. But there is everything in the external appearance of this plant to lead one to infer that an examination of other and better specimens, in which the sporidia may be more mature, would induce us to add this plant to *Verr. pyrenophora*, ACH.

55. *Verrucaria mutabilis.*

Adde syn. *Verrucaria macularis*, γ. *acrotella*, Schær. Enum. 214.

56. *Verrucaria irrigua.*

See remarks under *Segestrella thelostóma.*

57. *Verrucaria immersa.*

Adde syn. *Verrucaria rupestris*, Schær. Enum. 217.

59. *Verrucaria maura.*

Adde syn. *Pyrenula maura*, Schær. Enum. 209.

61. *Verrucaria epipolæa.*

Adde syn. *Verrucaria epipolæa*, α. Schær. Enum. 218.

62. *Verrucaria margacea.*

Adde syn. *Pyrenula margacea*, Schær. Enum. 211. *Pyrenula submersa*, Schær. Enum. 209.

Verrucaria nigrescens.

Adde syn. *Pyrenula nigrescens*, Schær. Enum. 219.

63. *Verrucaria elæina.*

Adde syn. *Pyrenula elæina*, Schær. Enum. 208.

64. *Verrucaria epigæa.*

Adde syn. *Thrombium epigæum*, Schær. Enum. 222, tab. viii. fig. 4. *b. c.*

Verrucaria Hookeri.

Adde syn. *Lecidea Hookeri*, Schær. Enum. 102. Certainly not a Lecidea. Our Plate XXVII will show its true structure.

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65. *Pyrenothea leucocephala.*

Adde syn. *Lecidea leucocephala*, *α. globulifera* (excl. syn. *Verrucaria aphanes*), Schær. Enum. 138.
The parasitic *Patellulæ* are synonymous with *Lecidea leucocephala*, *c. Lecidina*, Schær. Enum. 131.

66. *Pyrenothea rudis.*

Adde syn. *Verrucaria rudis*, Schær. Enum. 214.

67. *Pyrenothea aphanes.*

Adde syn. *Lecidea leucocephala*, *α. globulifera* (excl. syn. *Verr. leucocephala*), Schær. Enum. 131.

Pyrenothea niveo-atra.

Adde syn. *Thrombium niveo-atrum*, Schær. Enum. 224.

Pyrenothea mollis.

Adde syn. *Verrucaria mollis*, Schær. Enum. 214.

69. *Cliostomum corrugatum.*

Adde syn. *Lecanora varia*, *δ. graniformis*, Schær. Enum. 82.

Lecidea Ehrhartiana.

Adde syn. *Lecidea varia*, *γ. Ehrhartiana*, Schær. Enum. 82.

The above synonomy might doubtless have been rendered more satisfactory, had I had access to Schærer's 'Lich. Exsic.,' which valuable set of specimens I regret I do not possess.

EXPLANATION OF PLATES.

Plate I.

Fig. 1. *Sphærophoron coralloides, α laxum,* T. and B. (p. 7.)

A. Vertical section of the Thallus and Apothecium. B. Sporidia. *a.* Medullary layer of the Thallus. *b.* Asci. *c.* Torus. *d.* Sporidia discharged of internal granular matter. *e.* Sporidia, perfect, with internal granular matter. *f.* Cortical layer.

The figures indicate the powers of Powell and Lealand's microscope, which have been used in magnifying the objects, *e.g.* 1. 1. signifies that an object glass of 1-inch focus has been used with the first or longest eye-piece, $\frac{1}{8}$ 3 = an object glass of $\frac{1}{8}$ of an inch focus with the third and shortest eye-piece, and so on; the first figure or fraction always meaning the focus of the object glass, and the second the particular eye-piece used with it. The following table exhibits an approximation to the magnifying powers of the object-glasses with each eye-piece:—

Inch	$\frac{1}{16}$	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{2}$	1	2
First and longest eye-piece.	700	330	170	75	40	20
Second eye-piece .	1,400	660	340	150	80	40
Third and shortest eye-piece.	2,500	1,200	600	250	140	70

The drawings have been reduced one third, consequently the engraved figures are, in reality, one third less in size than the objects appeared under the microscope.

2. *Sphærophoron coralloides,* β. *cæspitosum,* T. and B. (p. 8.)

g. Sporidia in an old state.

The other letters refer to the same parts as in the preceding.

Fig. 3. *Sphærophoron compressum*, Ach. (p. 9.)

A. Vertical section of apothecium. B. B. Sporidia. *a.* Medullary layer. *b.* Asci. *c.* Torus. *d.* Sporidia discharged of internal granular matter. *e.* Sporidia with internal granular matter. *f.* Cortical layer.

4. *Endocarpon miniatum*, *a. umbilicatum*, Hook. (p. 11.)

A. Vertical section of thallus and apothecium. B. Sporidia. C. Perforated dark brown spot surmounting the perithecium. *a.* Cortical layer. *b.* Green layer. *c.* Medullary layer. *d.* Apothecium. *e.* Perithecium. *f.* Nucleus.

Plate II.

Fig. 1. *Endocarpon miniatum*, β. *complicatum*, Hook. (p. 11.)

A. Vertical section of thallus and apothecia. B. Sporidia. *a.* Cortical layer. *b.* Green layer. *c.* Medullary layer. *d.* Apothecium. *e.* Perithecium. *f.* Nucleus.

2. *Endocarpon leptophyllum*, Ach. (p. 12.)

A. Vertical section of thallus and apothecium. B. Sporidia. *a.* Cortical layer. *b.* Green layer. *c.* Medullary layer. *d.* Apothecium. *e.* Perithecium. *f.* Nucleus.

3. *Endocarpon euplocum*, Ach. (p. 12.)

A. Vertical section of thallus and apothecium. B. Sporidia. *a* Cortical layer. *b.* Green layer. *c.* Medullary layer. *d.* Apothecium. *e.* Perithecium. *f.* Nucleus.

4. *Endocarpon psoromoides*, Hook. (p. 13.)

A. Vertical section of thallus and apothecium. B. Sporidia. C. Perforated dark brown spot surmounting the perithecium. *a.* Cortical layer. *b.* Green layer. *c.* Medullary layer. *d.* Apothecium. *e.* Perithecium. *f.* Nucleus.

Plate III.

Fig. 1. *Endocarpon pulchellum*, Hook. (p. 13.)

A. Vertical section of thallus and apothecium. B. Sporidia. *a.* Cortical layer. *b.* Green layer. *c.* Medullary layer. *d.* Apothecium. *e.* Perithecium. *f.* Nucleus.

2. *Endocarpon lachneum*, Ach. (p. 14.)

A. Vertical section of thallus and apothecium. B. Sporidia. *a.* Cortical layer. *b.* Green layer. *c.* Medullary layer. *d.* Apothecium. *e.* Perithecium. *f.* Nucleus.

3. *Endocarpon Hedwigii*, Ach. (p. 14.)

A. Vertical section of thallus and apothecium. B. Sporidia. *a.* Cortical layer. *b.* Green layer. *c.* Medullary layer. *d.* Apothecium. *e.* Perithecium. *f.* Nucleus.

4. *Endocarpon sulphureum*, Tayl. (p. 15.)

A. Vertical section of thallus and apothecium. *f.* Nucleus.

Plate IV.

Fig. 1. *Endocarpon rugosum*, Tayl. (p. 15.)

A. Vertical section of thallus and apothecium. *a.* Cortical layer. *b.* Green layer. *e.* Medullary layer. *f.* Nucleus.

2. *Endocarpon macrocarpum*, Tayl. (p. 15.)

A. Vertical section of thallus and apothecium. B. Sporidia. *e.* Perithecium. *f.* Nucleus.

3. *Endocarpon smaragdulum*, Ach. (p. 16.)

A. Vertical section of thallus and apothecium. B. Sporidia. *a.* Cortical layer. *b.* Green layer. *c.* Medullary layer. *d.* Apothecium. *e.* Perithecium. *f.* Nucleus. *g.* Ascus and paraphyses.

4. *Endocarpon rufo-virescens*, Tayl. (p. 16.)

A. Vertical section of thallus and apothecium. B. Sporidia. *a.* Cortical layer. *b.* Green layer. *c.* Medullary layer. *f.* Nucleus.

Plate V.

Fig. 1. *Endocarpon sinopicum*, Ach. (p. 16.)

A. Vertical section of thallus and apothecium. B. Sporidia. *a*. Cortical layer. *b*. Green layer. *c*. Medullary layer. *d*. Apothecium. *e*. Perithecium. *f*. Nucleus. *g*. Section of nucleus, showing position of asci and paraphyses.

2. *Endocarpon sorediatum*, Hook. (p. 18.)

A. Vertical section of thallus and apothecium. B. Sporidia. *a*. Cortical layer. *b*. Green layer. *c*. Medullary layer. *d*. Apothecium. *e*. Perithecium. *f*. Nucleus. *g*. Ultimate spores or granular contents of the sporidia.

3. *Endocarpon pallidum*, Ach. (p. 19.)

A. Vertical section of thallus and apothecium. B. Sporidium. *a*. Cortical layer. *b*. Green layer. *c*. Medullary layer. *d*. Apothecium. *e*. Perithecium. *f*. Nucleus. *g*. Granular contents of sporidium.

Plate VI.

Fig. 1. *Verrucaria lithina*, Ach. from an authentic specimen from Swartz in herb. Borrer. (p. 19.)

A. Vertical section of thallus and apothecium. B. Sporidia.

2. *Endocarpon lithinum*. Llyn Bodlyn specimen in herb. Salwey. (p. 20.)

A. Vertical section of thallus and apothecium. B. Sporidia.

3. *Endocarpon fissum*. (p. 20.)

A. Vertical section of thallus and apothecium. B. Sporidium. C. Spores included in sporidium. D. Apothecium in profile. E. Apothecium as seen from above.

4. *Endocarpon isidioides*. (p. 20.)

A. Vertical section of thallus and apothecium. B. Sporidia.

PLATE VII.

Fig. 1. *Sagedia cinerea*, FRIES. (p. 22.)

A. Vertical section of thallus and apothecium. B. Sporidia.

2. *Sagedia fuscella*, FRIES. (p. 22.)

A. Vertical section of thallus and apothecium. B. Sporidia.

3. *Sagedia viridula*, FRIES. (p. 23.)

A. Vertical section of thallus and apothecium. B. Sporidia.

4. *Sagedia ochrostoma*, BORR. (p. 23.)

A. Vertical section of thallus and apothecium. B. Sporidia.

PLATE VIII.

Fig. 1. *Sagedia aggregata*, FRIES. (p. 24.)

A. Vertical section of thallus and apothecia. B. Sporidia.

2. *Sagedia circumscripta*. (p. 24.)

A. Vertical section of thallus and apothecia. B. Sporidia. C. Apothecium detached from the thallus.

3. *Chiodecton myrticola*, FEE. (p. 25.)

A. Section of thallodal wart and apothecium. B. Sporidia.

4. *Chiodecton albidum*. (p. 25.)

A. Section of thallodal wart and apothecium. B. Sporidia.

Plate IX.

Fig. 1. *Chiodecton albidum.* (p. 25.)

a. Apothecium as seen from above, showing the false border to the discs, formed by the substance of the thallodal wart, subsequently disappearing. *b.* Apothecium older, the false border having disappeared. *c. c.* Horizontal sections of apothecia, showing the form of the divisions of the torus.

2. *Chiodecton myrticola,* Fee. (p. 25.)

a. Apothecium as seen from above. *b.* Horizontal section of apothecium, showing the form of the divisions of the torus.

3. *Pertusaria communis,* De C. (p. 27.)

A. Section of thallus and apothecia. *a.* Cortical layer. *b.* Medullary layer. *c.* Apothecia. *d.* Receptacle. *e.* Nucleus, consisting of asci and paraphyses. B. Sporidia. C. Ascus with sporidia enclosed.

4. *Pertusaria ceuthocarpa,* Turn. and Borr. (p. 28.)

A. Vertical section of thallus and apothecia. B. Sporidia.

Plate X.

Fig. 1. *Pertusaria ceuthocarpa,* Turn. and Borr.; from Pigeon Island. (p. 28.)

A. Vertical section of thallus and apothecium. B. Sporidium. C. Ascus with sporidia enclosed.

2. *Pertusaria fallax,* Ach. (p. 29.)

A. Vertical section of thallodal wart and apothecium. B. Sporidia. C. Asci with enclosed sporidia embedded among the paraphyses.

3. *Pertusaria melaleuca.* (p. 29.)

A. A. Vertical sections of thallodal wart and apothecium. B. Sporidia.

4. *Pertusaria pustulata.* (p. 30.)

A. Vertical section of thallodal wart and apothecium. B. Sporidium.

Plate XI.

Fig. 1. *Pertusaria Hutchinsiæ.* (p. 30.)

A. Vertical section of thallus and apothecia. B. Sporidium.

2. *Pertusaria nov. spec.* (?) from Highlands of Scotland, in herb. Borrer. (p. 30.)

A. A. Vertical sections of thallodal wart and apothecium. B. Sporidium. C. Ascus with enclosed sporidia.

3. *Parmelia scruposa,* Fries. (p. 30.)

A. Vertical section of thallus and patellula. B. Sporidia.

4. *Parmelia scruposa,* β. *bryophila,* Fries. (p. 30.)

A. Vertical section of thallus and patellula. B. Sporidia.

Plate XII.

Fig. 1. *Thelotrema lepadinum,* Ach. (p. 31.)

A. Vertical section of thallodal wart and apothecium. *a.* Thallodal wart. *b.* Receptacle. *c.* Nucleus. B. Sporidia.

2. *Thelotrema lepadinum,* β. *rupestre,* T. and B. (p. 32.)

A. Vertical section of thallodal wart and apothecium. B. Sporidium.

3. *Thelotrema exanthematicum,* Ach. (p. 32.)

A. A. Vertical sections of thallodal wart and apothecium. B. B. Sporidia. C. Nucleus and receptacle dissected out from thallodal wart. *a. a. a.* Lacerated divisions of the upper part of the receptacle. *b.* Semi-opaque membrane of the receptacle. *c.* Thickened base.

PLATE XIII.

Fig. 1. *Gyalecta cupularis*, SCHÆR., from Mr. Borrer. (p. 33.)

A. Vertical section of thallus and patellula. B. Sporidia.

2. *Gyalecta Wahlenbergiana*, ACH., from Mr. Borrer. (p. 33.)

A. Vertical section of thallus and patellula. B. Sporidia.

3. *Gyalecta Wahlenbergiana*, β. ACH., from Mr. Borrer. (p. 33.)

A. Vertical section of thallus and patellula. B. Sporidia.

4. *Lecanora involuta*, FL. HIB., Dr. Taylor, in herb. Borrer. (p. 33.)

A. Vertical section of thallus and patellula. B. Sporidia.

PLATE XIV.

Fig. 1. *Parmelia rubra*, ACH., from Mr. Borrer. (p. 33.)

A. Vertical section of thallus and patellula. B. Sporidia.

2. *Parmelia carneo-lutea*, TURN. from Mr. Borrer. (p. 33.)

A. Vertical section of thallus and patellula. B. Sporidia.

3. "*Lichen luteus*, DICKS." from Mr. Borrer. (p. 33.)

A. Vertical section of thallus and patellula. B. Sporidia.

4. *Lichen corneus*, E. BOT. (*Lecidia carneola*, ACH. SYN.) from Mr. Borrer. (p. 33.)

A. Vertical section of thallus and patellula. B. Sporidia.

PLATE XV.

Fig. 1. *Gyalecta geoica?* ACH. Cheddar from Mr. Borrer. (p. 33.)

A. Vertical section of thallus and patellula. B. Sporidia.

2. *Segestrella thelostoma,* FRIES. (p. 34.)

A. Vertical section of thallus and perithecium. *a.* Ascigerous disk. *b.* Tunic. *c.* Dark brown layer. *d. d.* Pale portion. *e. e.* Darker ring. *f. f.* Paler ring. *g. g.* Margin of thallodal wart. B. Sporidia. C. Perithecium as seen from above —the letters refer to the same parts as in A.

3. *Verrucaria nitida,* SCHRAD. (p. 35.)

A. Vertical section of thallus and apothecium. *a.* Carbonaceous perithecium. *b.* Pale inner tunic. *c.* Nucleus. B. Sporidia.

4. *Verrucaria nitida. β. dermatodes.* (p. 36.)

A. A. A. A. Vertical sections of thallus and apothecium. B. Sporidia.

PLATE XVI.

Fig. 1. *Verrucaria rhyponta,* ACH. (p. 37.)

A. Vertical section of thallus and apothecium. B. Sporidia.

2. *Verrucaria biformis,* E. BOT. SUPPL. (p. 37.)

A. Vertical section of thallus and apothecium. B. Sporidia.

3. *Verrucaria byssacea,* TAYL. (p. 38.)

A. Vertical section of thallus and apothecium. B. Sporidia.

4. *Verrucaria byssacea (vera),* SCHÆR. (p. 38.)

A. A. Vertical sections of thallus and apothecium. B. Sporidia.

5. *Verrucaria byssacea, var. stictica,* SCHLEICHER, (p. 38.)

A. Vertical section of apothecia. B. Sporidia.

Plate XVII.

Fig. 1. *Verrucaria conferta*, Fl. Hib. (p. 39.)

A. Vertical section of thallus and apothecium. B. Sporidia.

2. *Verrucaria cinerea*, Pers. (p. 39.)

A. Vertical section of thallus and apothecium. B. B. Sporidia.

3. *Verrucaria epidermidis*, Ach. (p. 40.) Upper fig. on Birch bark. Lower fig. minute punctiform state on Birch bark.

A. Vertical section of thallus and apothecium. B. Sporidia.

4. *Verrucaria epidermidis* β. *analepta*, Hook. (p. 40.) On Oak bark.

A. Vertical section of thallus and apothecium. B. Sporidia.

5. *Verrucaria punctiformis*, Pers. (p. 41.)

A. A. A. Vertical section of thallus and apothecium. B. Sporidia. C. Ascus with enclosed sporidia.

Plate XVIII.

Fig. 1. *Verrucaria olivacea*, Pers. (p. 42.)

A. Vertical section of thallus and apothecium. B. Sporidia.

2. *Verrucaria fusiformis*. (p. 42.

A. A. Vertical section of thallus and apothecium. B. Sporidia.

3. *Verrucaria Lyellii*. (p. 42.)

A. Vertical section of thallus and apothecium. B. B. Sporidia.

4. *Verrucaria gemmata*, Ach. (p. 43.)

A. Vertical section of thallus and apothecium. B. B. Sporidia.

5. *Verrucaria alba*. (p. 43.)

A. Vertical section of thallus and apothecium. B. B. B. Sporidia.

Plate XIX.

Fig. 1. *Verrucaria lævata*, Ach. (p. 44.)

A. Vertical section of thallus and apothecium. B. Sporidia. C. Ascus with enclosed sporidia. D. Apothecia.

2. *Verrucaria lævata*, Ach. (p. 44.)

A. Vertical section of thallus and apothecium. B. B. Sporidia.

3. *Verrucaria murina*. (p. 44.)

A. Vertical section of thallus and apothecium. B. Sporidia.

4. *Verrucaria Harrimanni*, Ach. (p. 45.)

A. Vertical section of thallus and apothecium.

5. *Verrucaria plumbea*, Ach. (p. 45.)

A. Vertical section of thallus and apothecium. B. Sporidia.

Plate XX.

Fig. 1. *Verrucaria muralis*, Ach. (p. 46.)

A. Vertical section of thallus and apothecium. B. Sporidia.

2. *Verrucaria litoralis*, Tayl. M.S. (p. 46.)

A. A. Vertical section of thallus and apothecium. B. Apothecium. C. Sporidia.

3. *Verrucaria gemmifera*, Tayl. (p. 47.)

A. Vertical section of thallus and apothecium. B. Sporidia. C. Asci with enclosed sporidia.

4. *Verrucaria gemmifera*, Tayl. (p. 47.)

A. Vertical section of thallus and apothecium. B Sporidia.

Plate XXI.

Fig. 1. *Verrucaria rugulosa*, Borr. (p. 47.)

A. Vertical section of thallus and apothecium. B. Sporidia.

2. *Verrucaria peripherica*, Tayl. (p. 48.)

A. Vertical section of thallus and apothecium. B. Sporidia, loose and in ascus. C. Detached apothecia.

3. *Verrucaria umbrosa*, Tayl. (p. 48.)

A. Vertical section of thallus and apothecium. B. Sporidia. C. Apothecium.

4. *Verrucaria macrostoma*, De C. (p. 48.)

A. Vertical section of thallus and apothecium. B. Sporidia.

5. *Verrucaria polysticta*, Borr. (p. 49.)

A. Vertical section of thallus and apothecium. B. Sporidia.

Plate XXII.

Fig. 1. *Verrucaria trachona*, Tayl. (p. 50.)

A. Thallus and apothecia in profile. B. Vertical section of apothecium. C. Sporidia. D. Thallus and apothecia, as seen from above.

2. *Verrucaria trachona*, Tayl. *variety*. (p. 50.)

A. Vertical section of apothecium. B. Sporidia.

3. *Verrucaria concinna*, Borr. *V. Dufourii*, D.C. (pp. 50 and 76.)

A. Vertical section of thallus and apothecium. B. Sporidia.

4. *Verrucaria Dufourii*, E.B.S. *V. Borreri*. (pp. 51 and 76.)

A. Thallus and apothecia in profile. B. Apothecium, as seen from above. C. C. C. C. Vertical section of apothecium. D. Asci and paraphyses. E. Sporidia.

Plate XXIII.

Fig. 1. *Verrucaria linearis.* (p. 52.)

A. Thallus and apothecia in profile. B. B. B. Vertical section of thallus and apothecia. C. Ascus and paraphyses. D. Sporidia.

2. *Verrucaria umbrina,* Ach. (p. 52.)

A. Vertical section of thallus and apothecium. B. Sporidia.

3. *Verrucaria codonoidea.* (p. 53.)

A. Thallus and apothecia in profile. B. Section of thallus and apothecia. C. Sporidia.

4. *Verrucaria Sprucei,* Ch. Bab. *V. pyrenophora,* Ach. (pp. 54 and 76.)

A. Thallus and apothecia in profile, from Barnaghee mountain. B. B. Vertical sections of thallus and apothecia. C. apothecium, as seen from above. D. Sporidia.

5. *Verrucaria Sprucei,* Ch. Bab., from Cumberland. (p. 54.)

A. Vertical section of thallus and apothecium. B. Sporidia.

6. *Verrucaria Sprucei,* Ch. Bab., Pyrenees. (p. 54.)

A. Sporidium.

Plate XXIV.

Fig. 1. *Verrucaria papillosa,* Ach. (pp. 54 and 77.)

A. Vertical section of thallus and apothecium. B. Sporidia.

2. *Verrucaria lucens,* Tayl. (p. 55.)

A. Thallus and apothecia in profile. B. Vertical section of thallus and apothecium. C. Sporidia.

3. *Verrucaria mutabilis,* Borr. (p. 55.)

A. Vertical section of thallus and apothecium. B. Sporidia.

4. *Verrucaria irrigua,* Tayl. (p. 56.)

A. Vertical section of thallus and apothecia. B. B. Sporidia.

5. *Lichen immersus,* E. Bot. (p. 59.)

A. Vertical section of patellula. B. Sporidia.

6. *Verrucaria erysiboda,* Tayl. (p. 56.)

A. Vertical section of thallus and apothecium. B. Sporidia.

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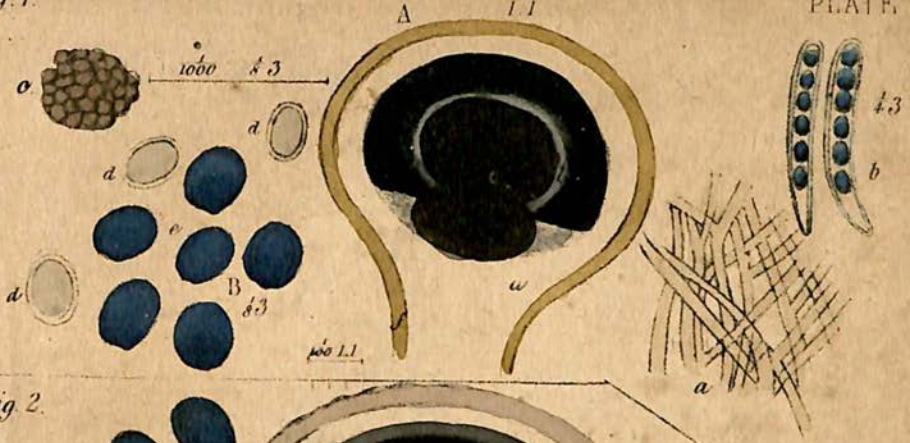

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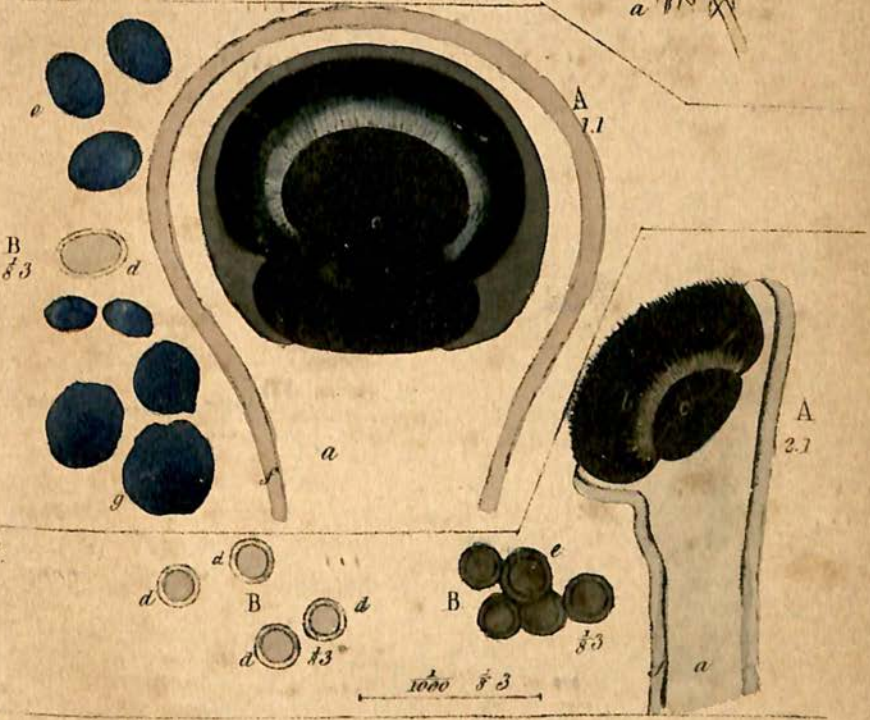

Fig. 3.

Fig. 4.

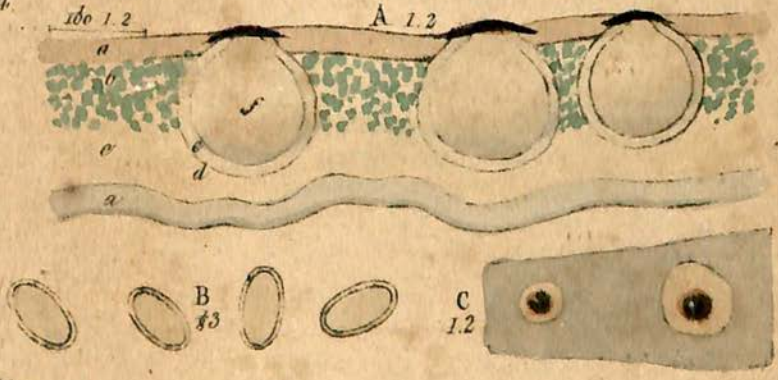

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Fig. 1. SPHÆROPHORON CORALLOIDES A LAXUM, T & B.
2 B. CÆSPITOSUM, T & B.
3 COMPRESSUM, ACH.
4 ENDOCARPON MINIATUM, A UMBILICATUM, HOOK.

Fig 1.

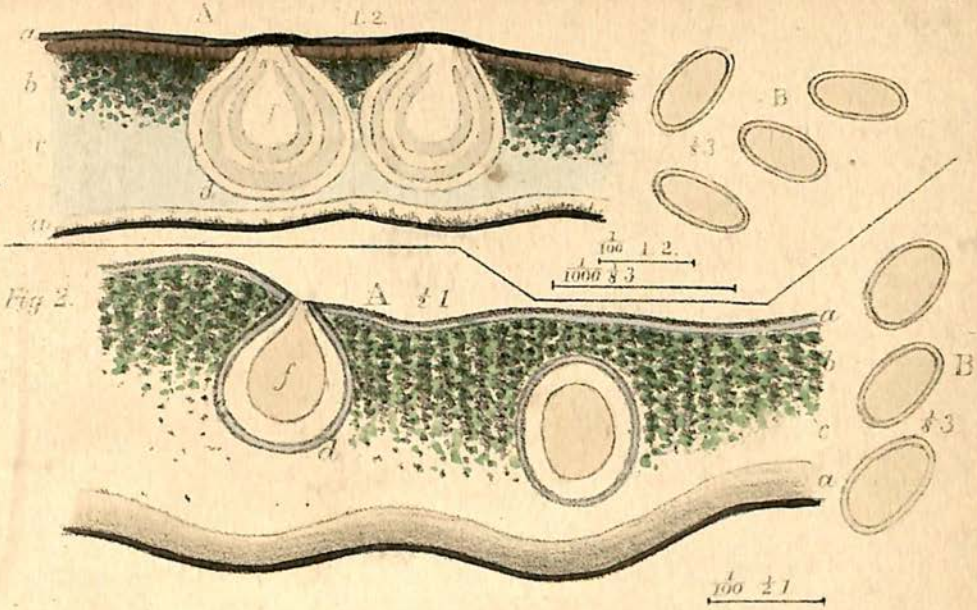
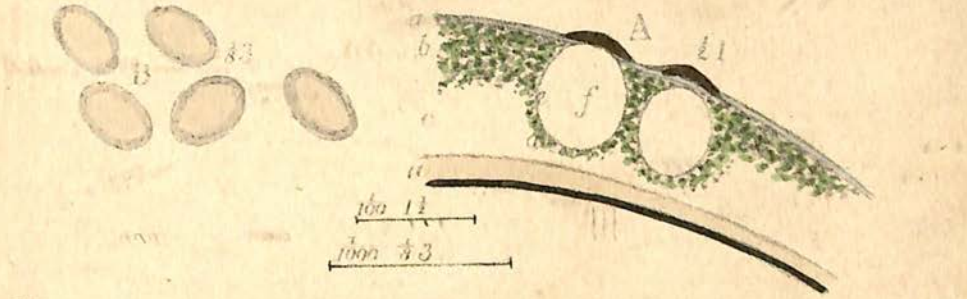


Fig 2.

Fig 3.



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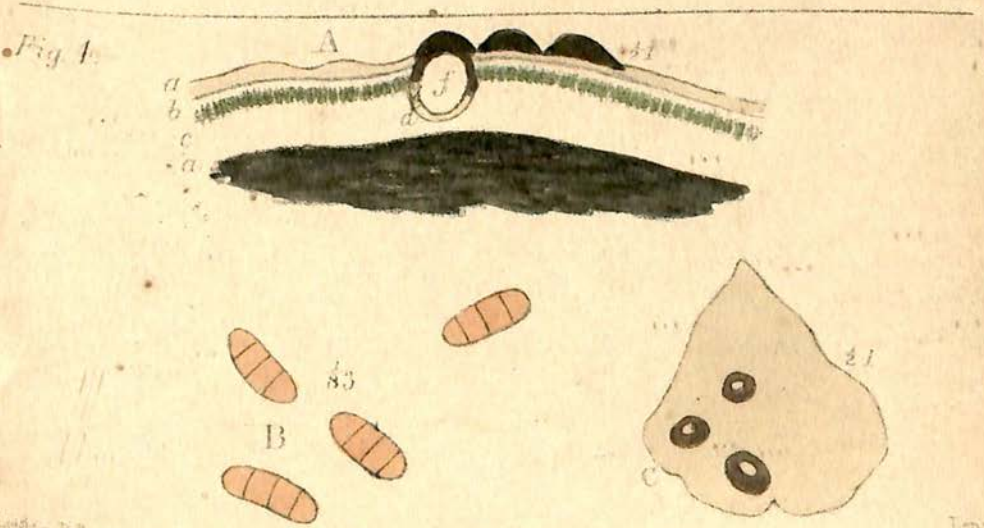
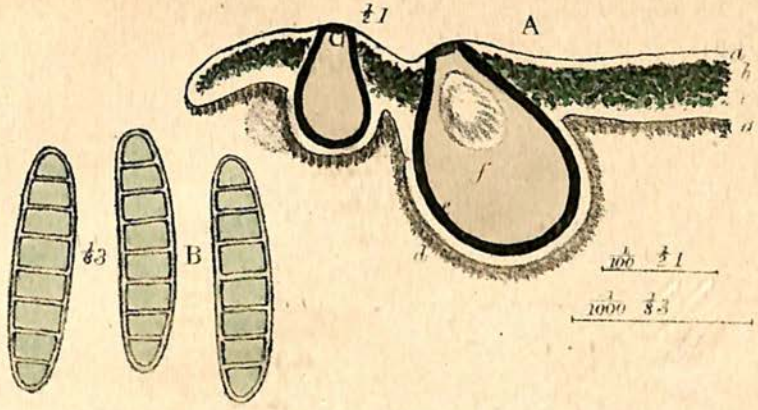


Fig 1. ENDOCARPON MINIATUM, B. COMPLICATUM. HOOK.
2. ——— LEPTOPHYLLUM. ACH.
3. ——— EUPLOCUM. ACH.
4. ——— PSOROMOIDES. HOOK.

Fig 1.



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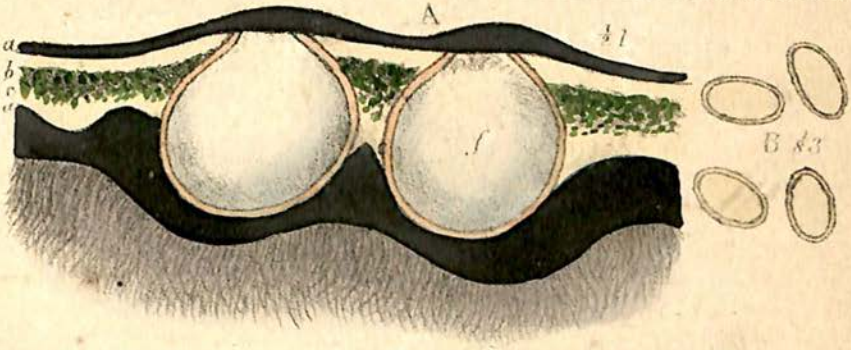

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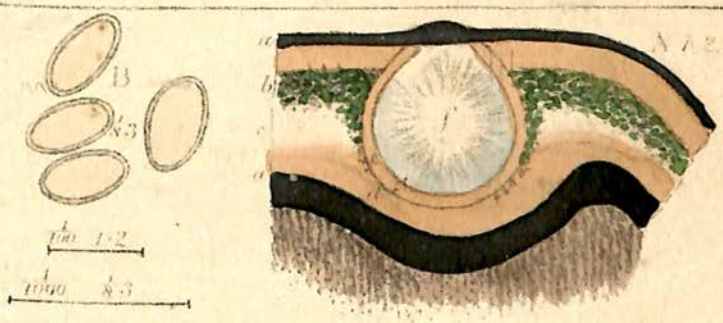


Fig 4

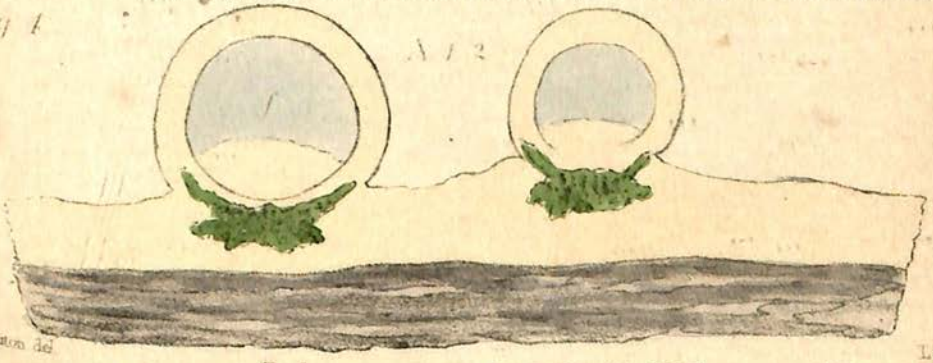
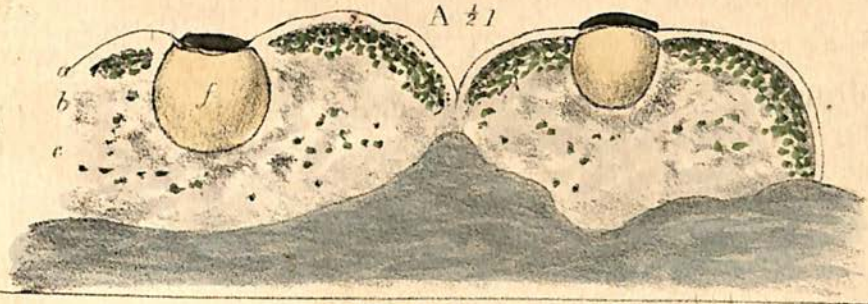


Fig 1/2 ENDOCARPON PULCHELLUM, BORR.
Fig 1/3 HEDWIGII, ACH.
Fig 1/4 SULPHUREUM, TAYL.

Fig 1.



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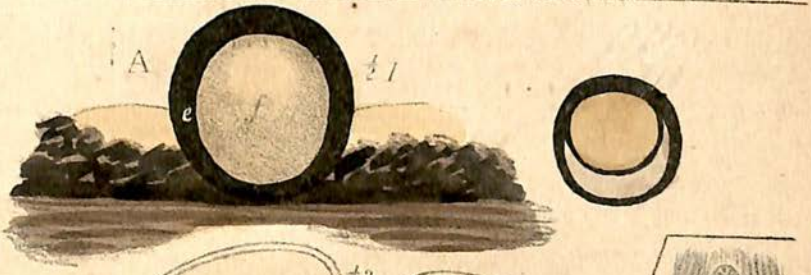

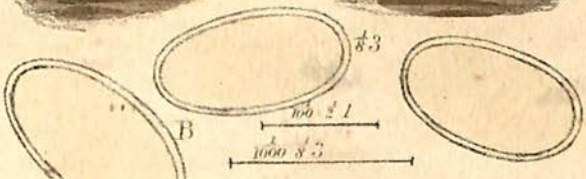

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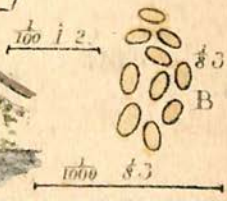
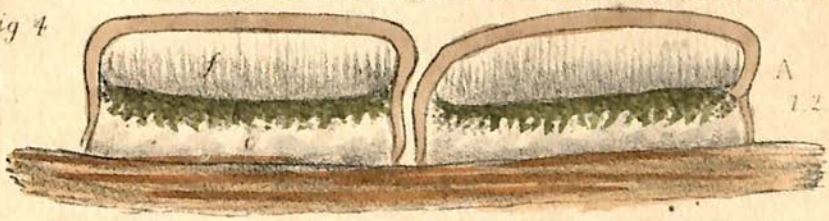
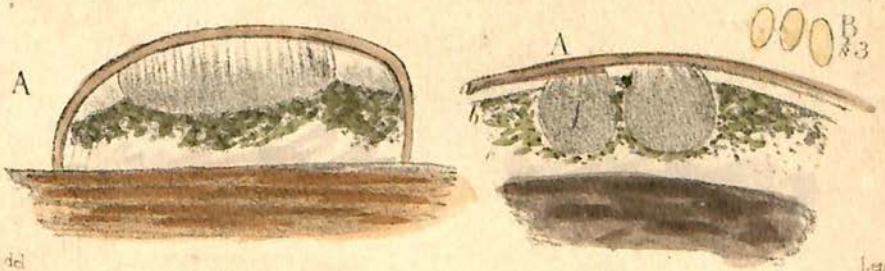


Fig 4





Leighton del

Lenc Aldous lith

Fig 1 ENDOCARPON RUGOSUM TAYL
2 MACROCARPON TAY
3 SMARAGDULUM ACH
4 RUFO-VIRESCENS TAYL

Fig 1

PLATE V

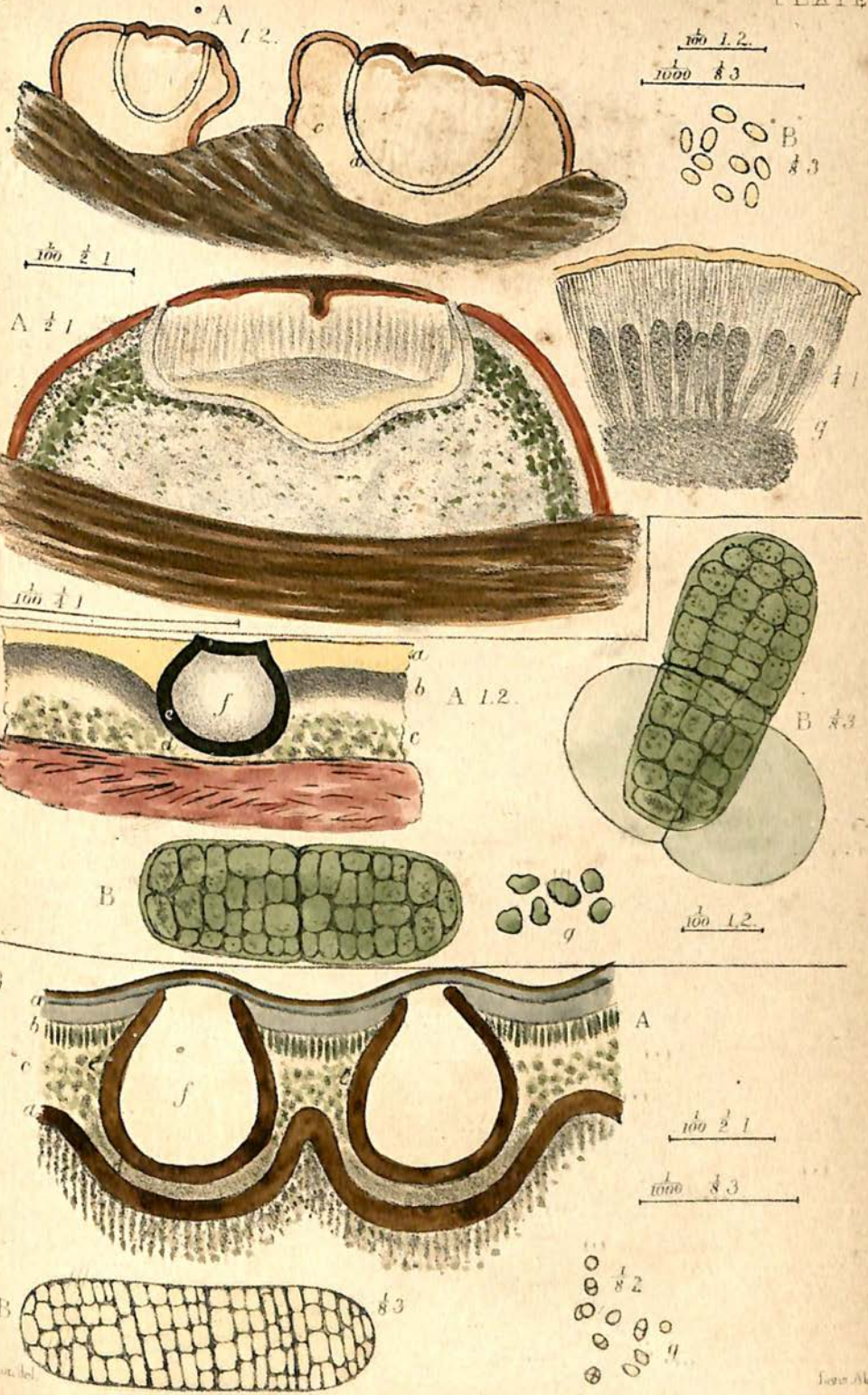


Fig 1/2 ENDOCARPON SINOPICUM ACH.
2/3 SOREDIATUM HOOK
PALLIDUM ACH

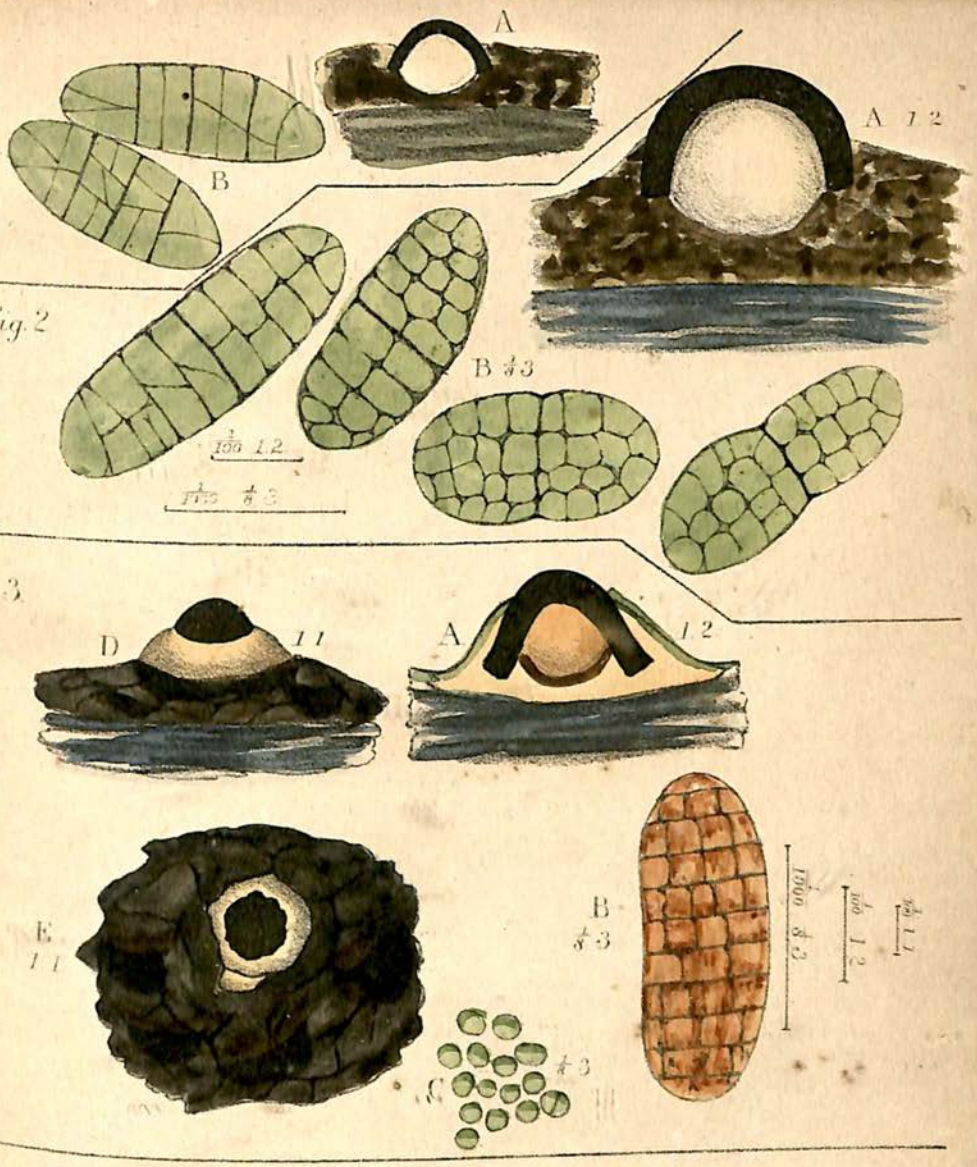
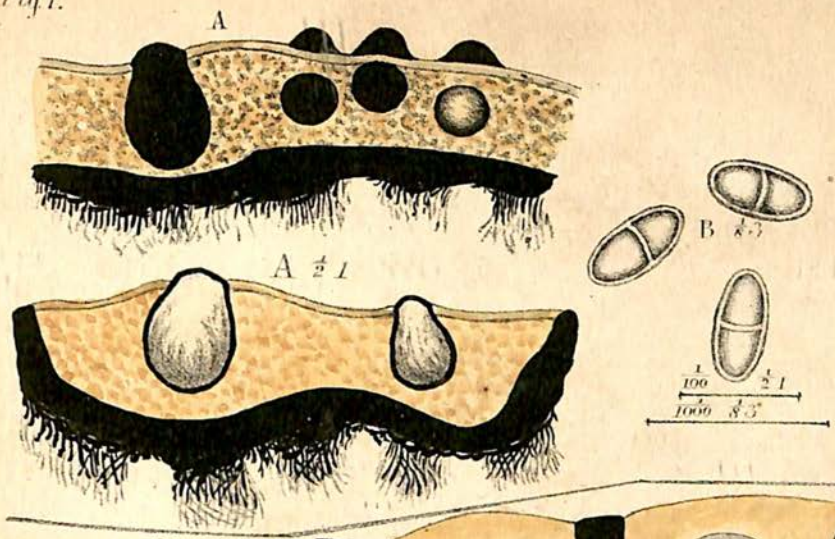


Fig. 1 VERRUCARIA LITHINA, ACH
— 2 ENDOCARPON LITHINUM.
— 3 ——— FISSUM.
— 4 ——— ISIDIOIDES.

Lens Allan

Fig 1.



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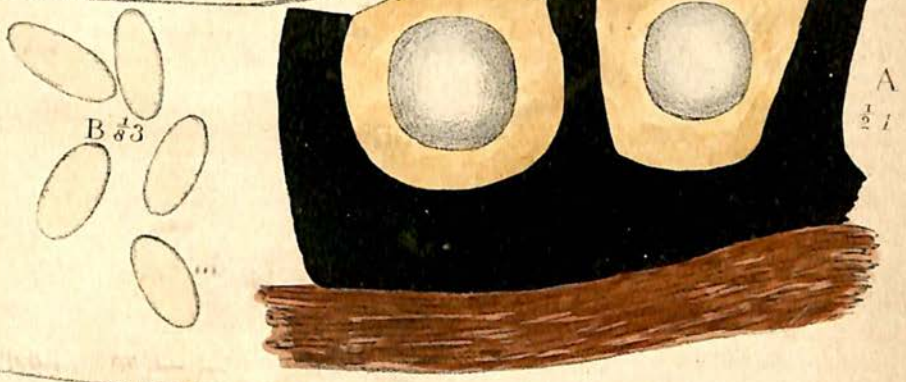

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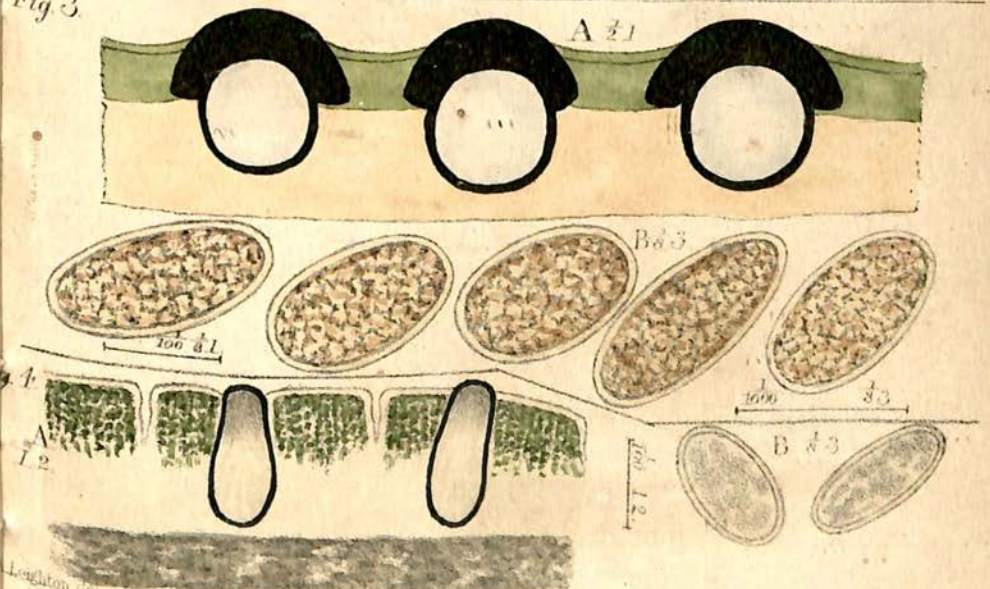
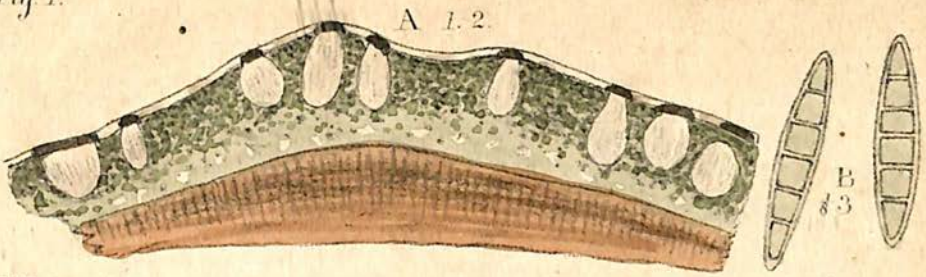


Longhurst del.

Fig. 1. SAGEDIA CINEREA, FRIES.
2. " FUSCELLA, FRIES.
3. " VIRIDULA, FRIES.
4. " OCHROSTOMA, BORR.

Fig. 1.



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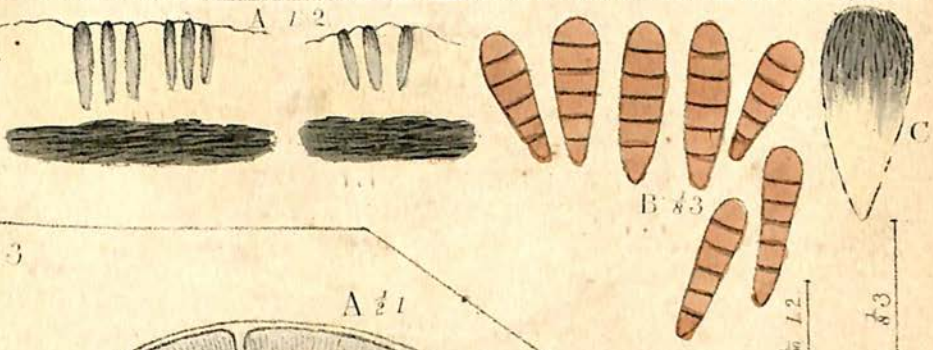


Fig. 3

Fig. 4.

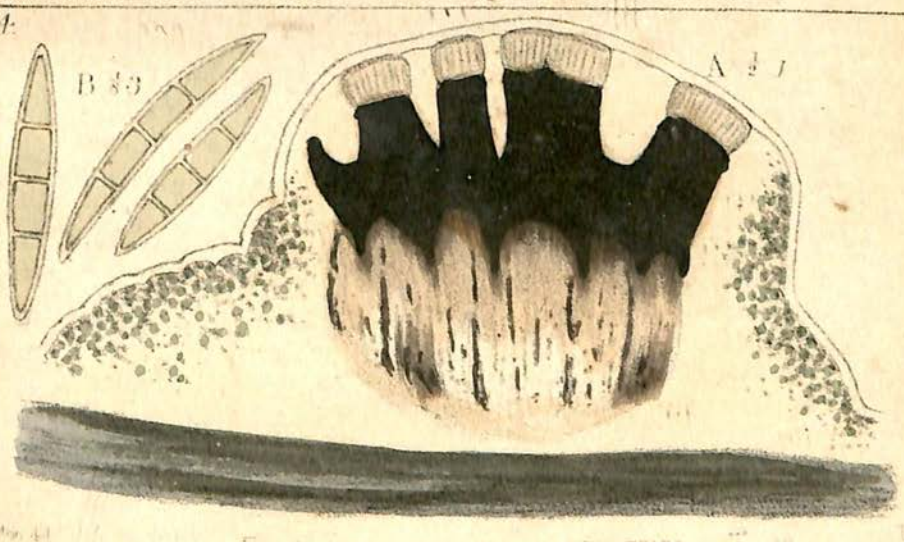
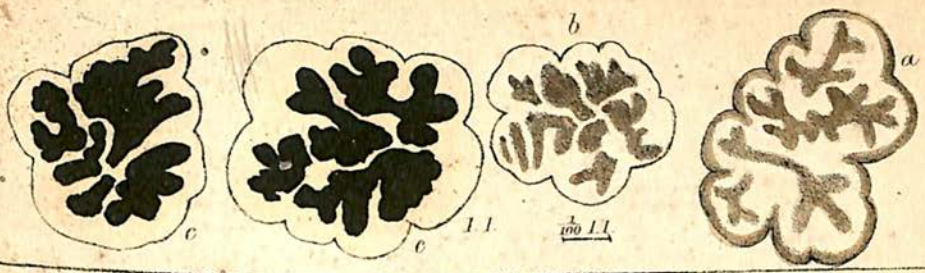


Fig. 1. SACCIA AGGREGATA FRIES.
2/3 CIRCUMSCRIPTA.
3/4 CHIODECTON MYRTICOLA, FÉE.
ALBIDUM.

Fig. 1.



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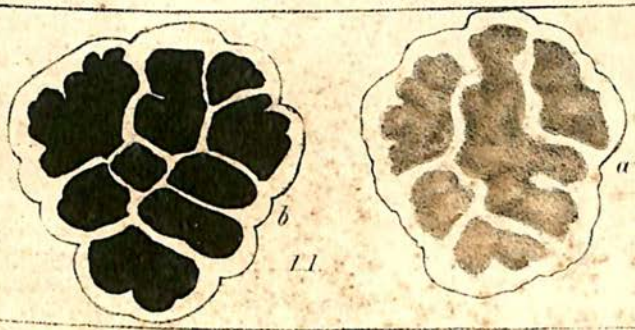


Fig. 3.

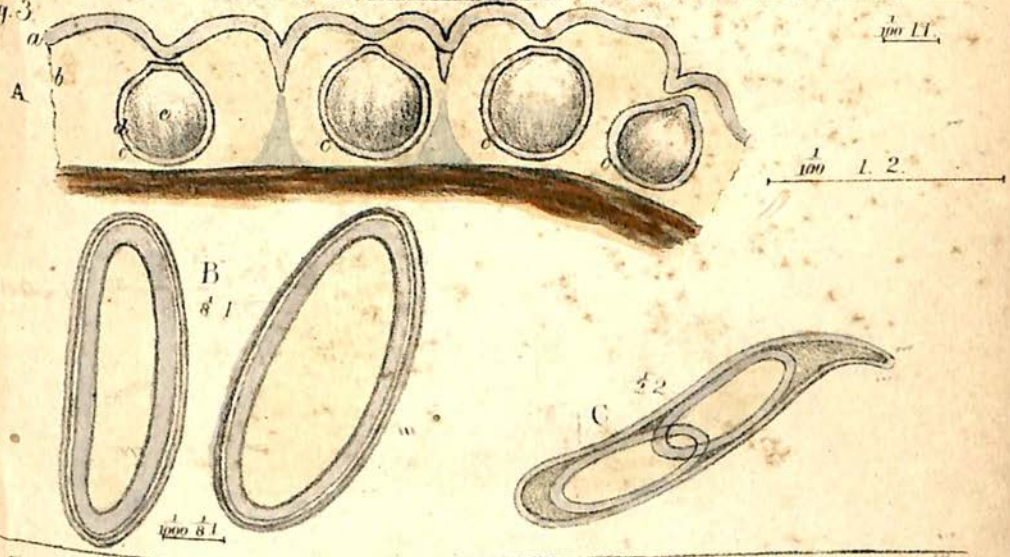
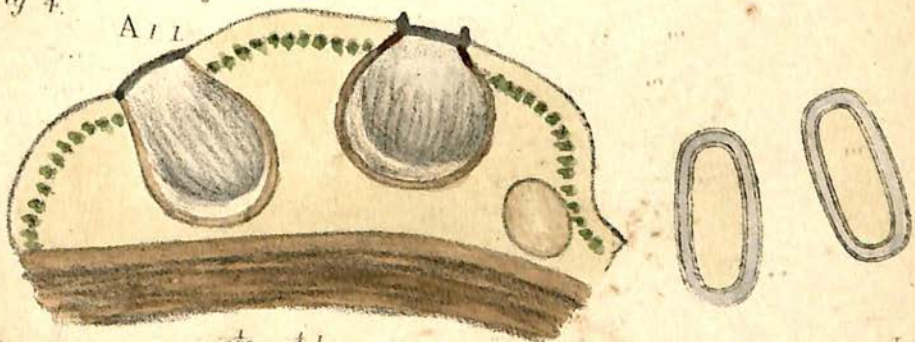


Fig 4.



W. A. Leighton. del.

Lemuel Aldour lith

Fig 1. CHIODECTON ALBIDUM.
2. MYRTICOLA, FÉE.
3. PERTUSARIA COMMUNIS. D.C.
4. CEUTHOCARPA, T. & B.

Fig 1

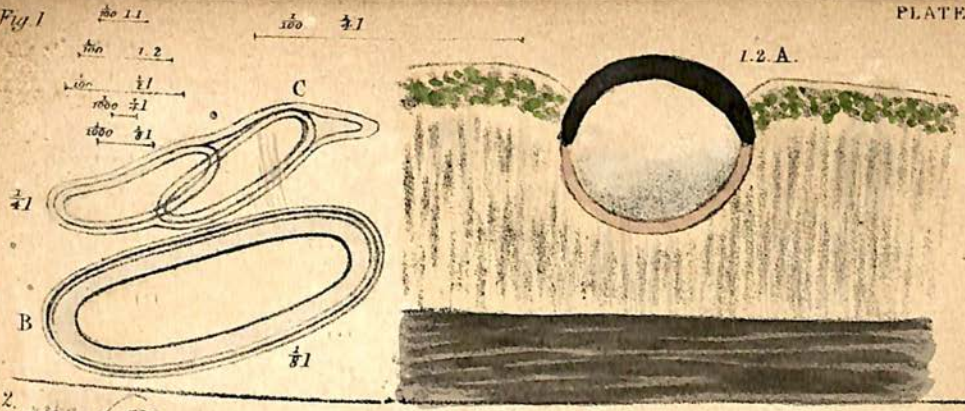


Fig 2.

Fig 3.

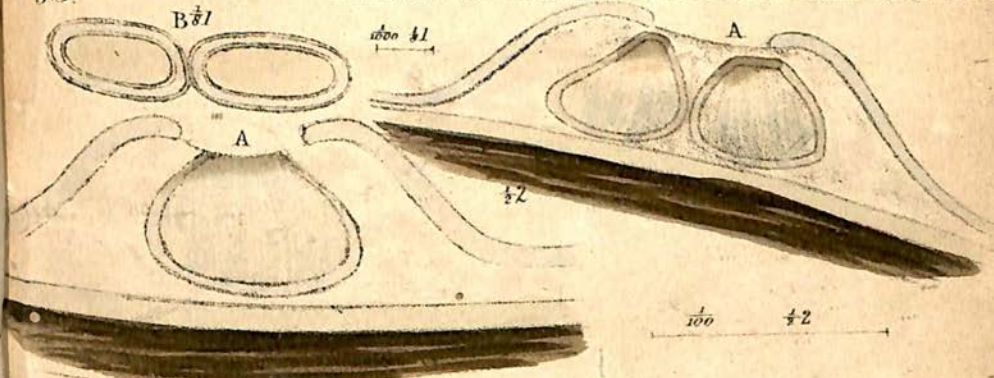
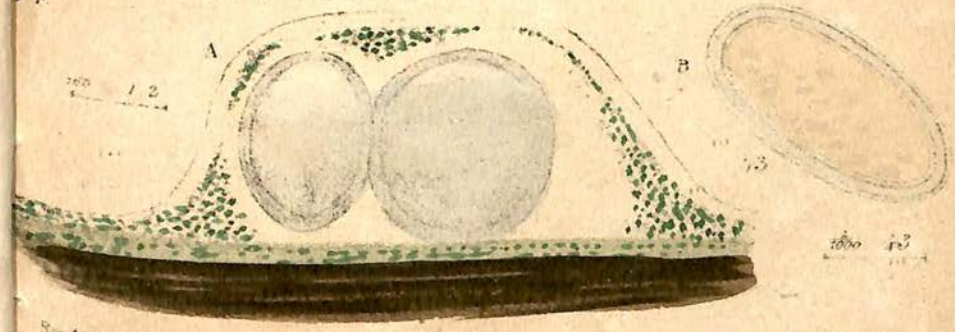


Fig 4.

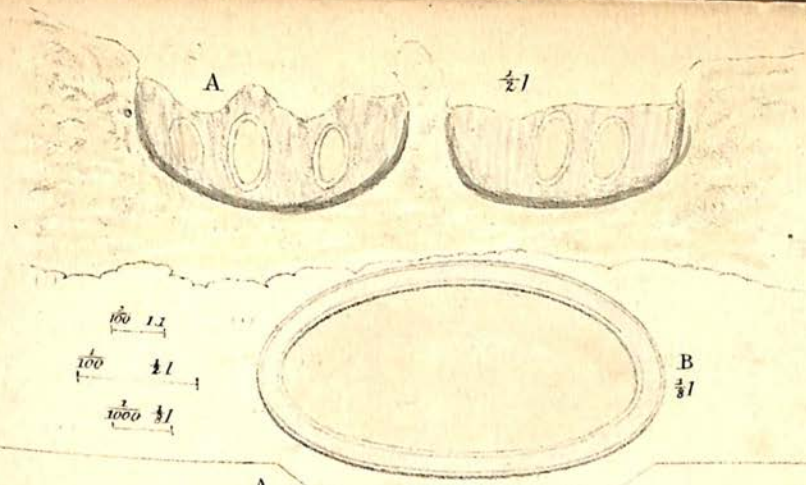


Rev^d W. A. Leighton, del.

Lens Albion lith

Fig 1 PERTUSARIA CEUTHOCARPA TURNER & BORR.
2 PRELAXA DC.
3 MELALEUCA
4 PUSTULATA

Fig 1.



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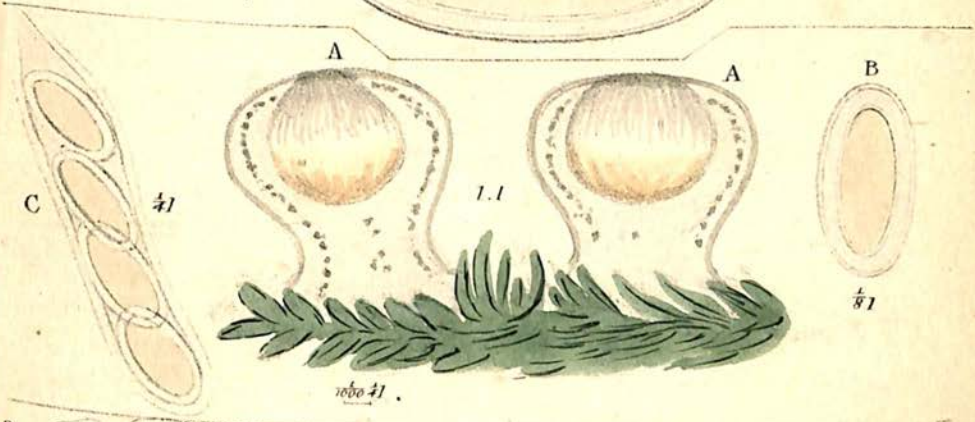


Fig 3.

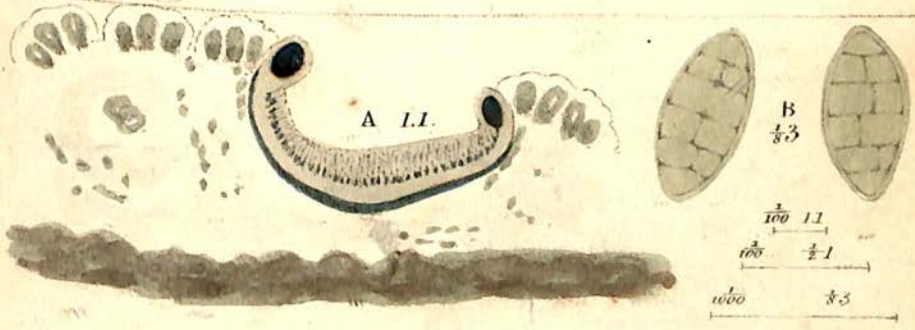
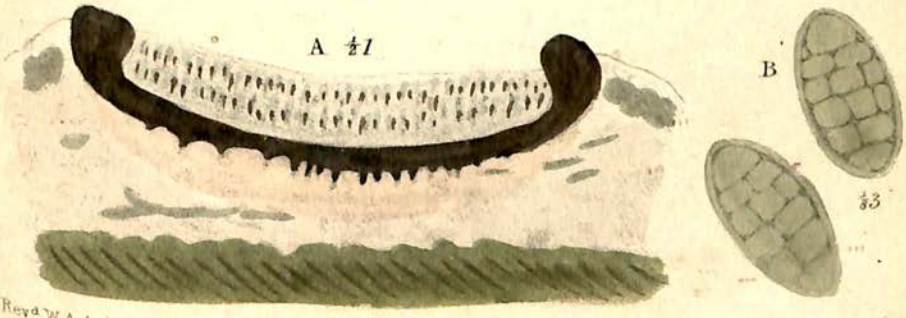


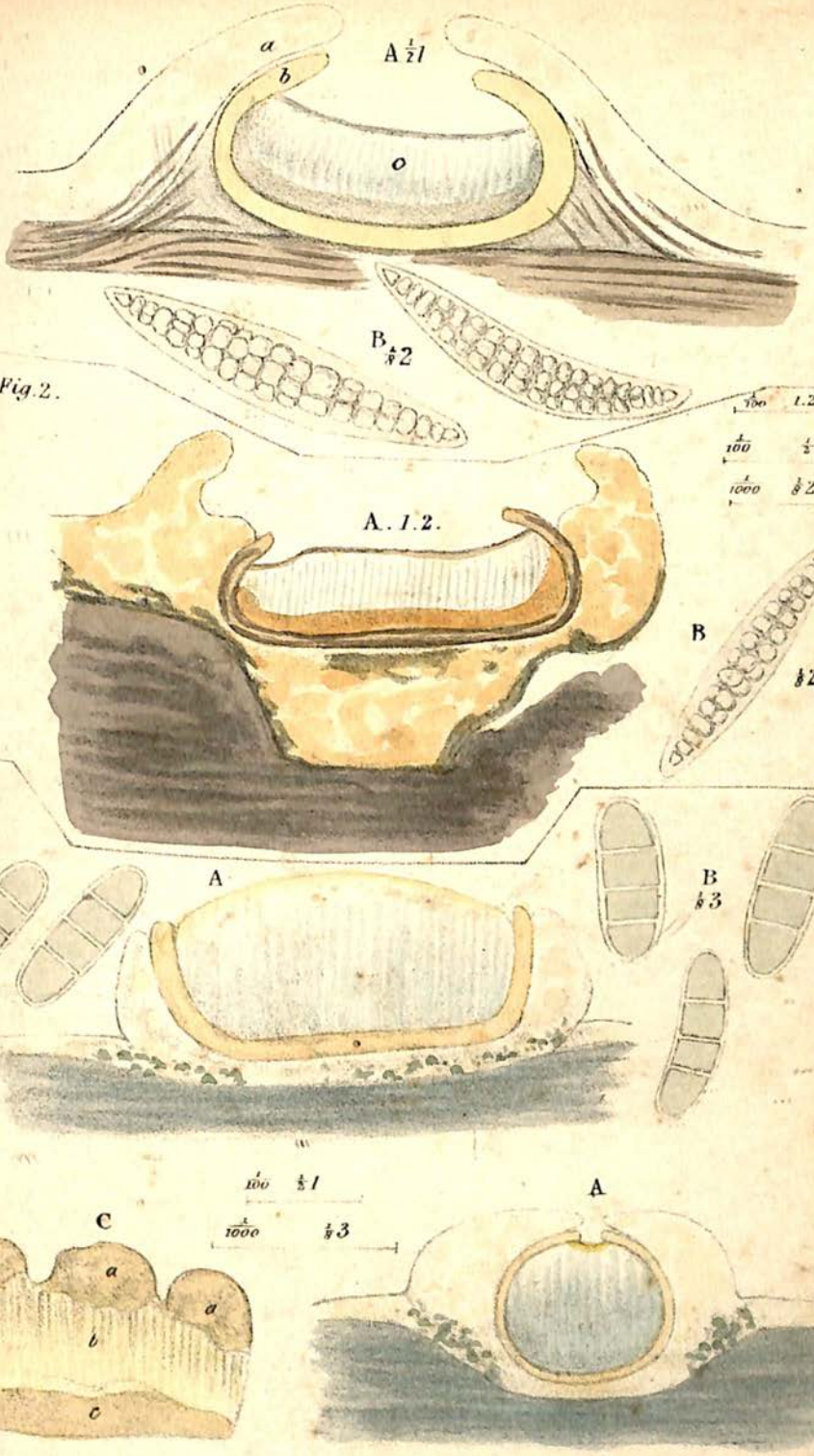
Fig 4.



Reyd W.A. Leighton, del.

Fig 1. PERTUSARIA HUTCHINS: N. SP: ?
" 2. ——————
" 3. PARMELIA SCRUPOSA, FRIES
" 4. —————— β. BRYOPHILA, FRIES.

Day & Son, lith. to The Queen.



Drawn W A Leighton, del.

Lens Aldous, lith.

Fig. 1 THELOTREMA LEPADINUM, ACH.
" 2 " BRUPESTRE, T & B.
" 3 " EXANTHEMATICUM, ACH.

Day & Son, Lith. to The Queen.

Fig.1.

PLATE XIII.

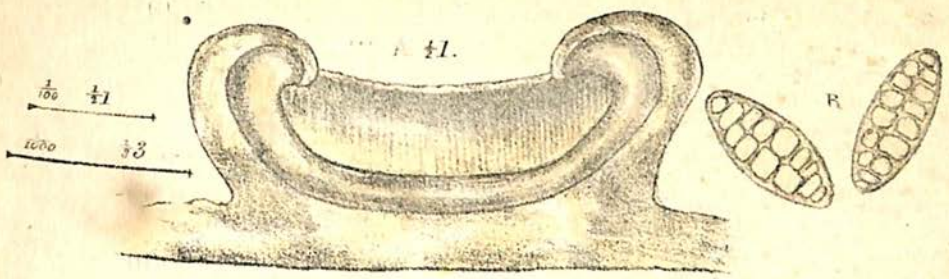


Fig.2.

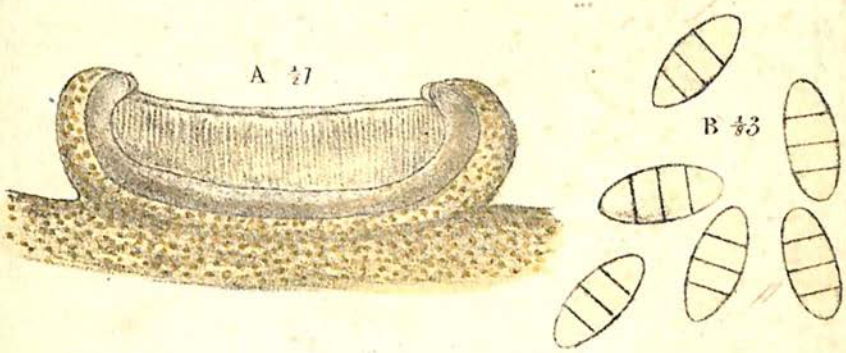


Fig.3.

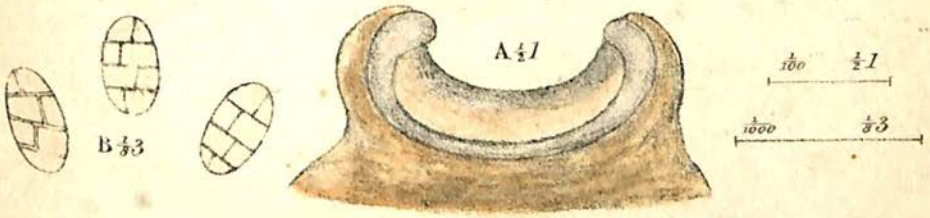


Fig.4.

Wm W. A. Laughton, del.

Lens Aldous, lith.

Fig. 1. CYALECTA CLPUTARIS. SCHÆR
2. WAHLENBERGIANA. ACH.
3. ACH
4 LECANORA INVOLUTA. FL. HIB

Fig. 1.

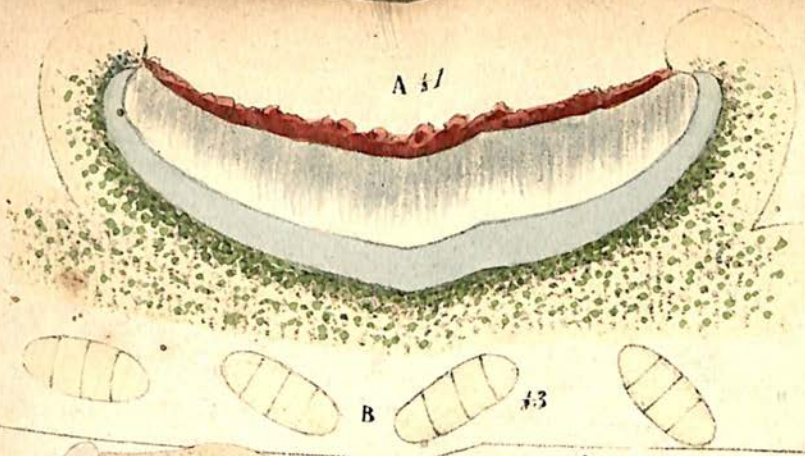


Fig. 2.

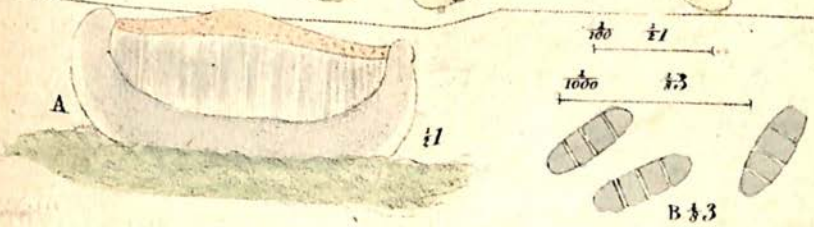


Fig. 3.

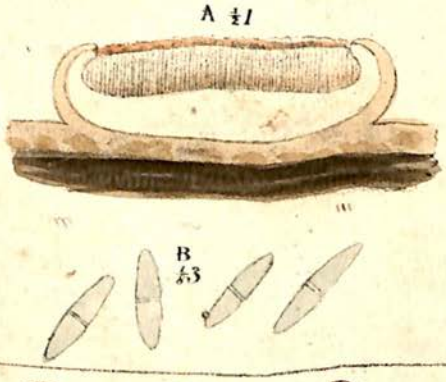
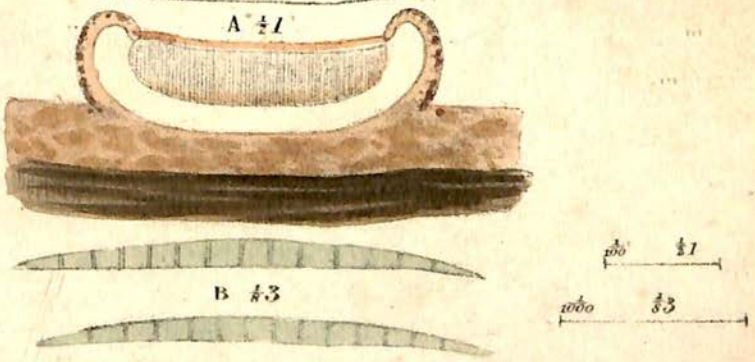


Fig. 4.



Wm W.A. Leighton, del.

Lens Aldous, lith

Fig. 1. PARMELIA RUBRA. ACH.
" 2. ——— CARNEO-LUTEA, TURN.
" 3. LICHEN LUTEUS, DICKS.
" 4. ——— CORNEUS, E. BOT. LEGIDEA CARNEOLA. ACH. SYN.

Day & Son Lith to the Queen

Fig. 1.

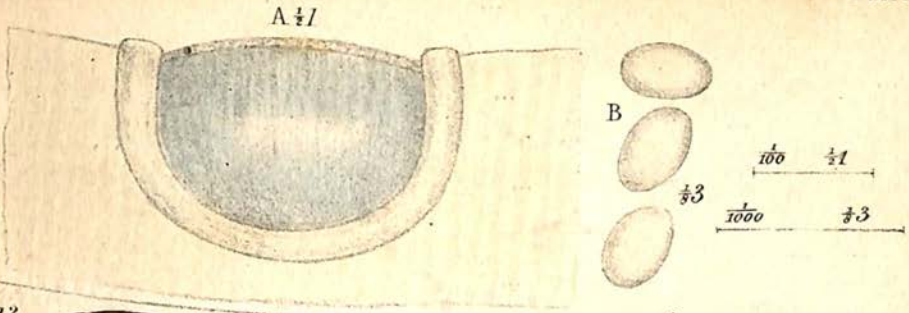


Fig. 2.

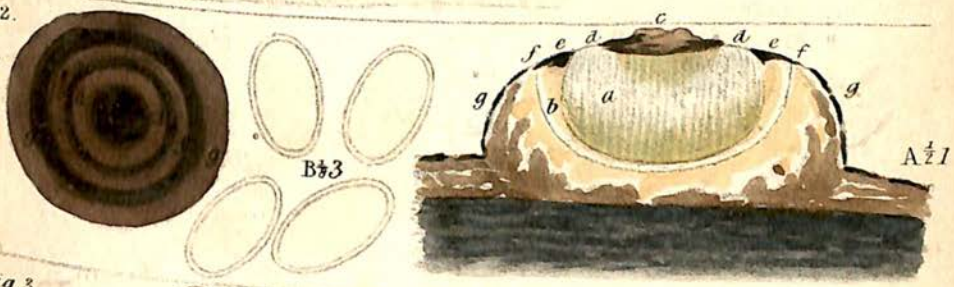


Fig. 3.

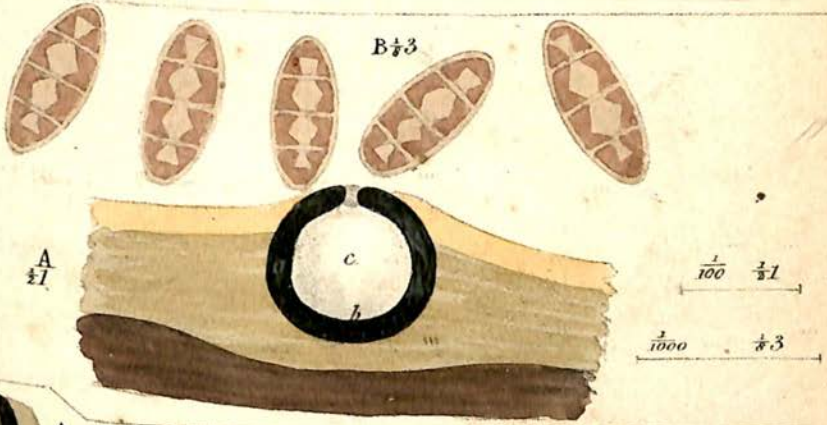
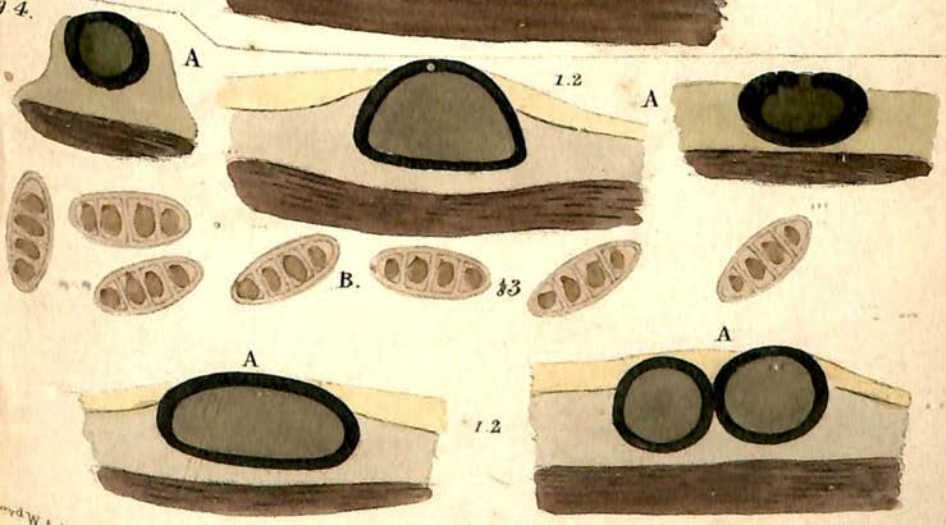


Fig 4.



Revd W.A. Leighton del.

Lens Aldous. lith.

Fig. 1 GYALECTA GEOICA? ACH.
" 2 SEGESTRELLA THELOSTOMA, FRIES.
" 3 VERRUCARIA NITIDA, SCHRAD
" 4 ..... β. DERMATODES

Day & Son, Lith. to The Queen.

Fig. 1.

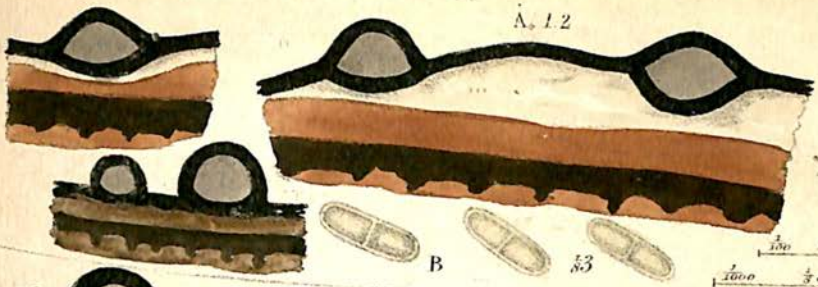


Fig. 2

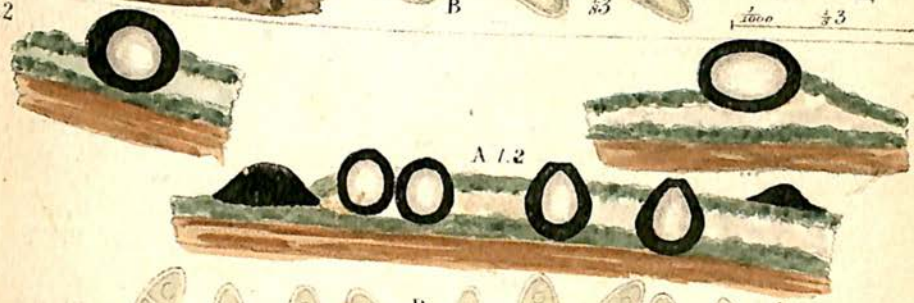


Fig 3.

Fig 4.

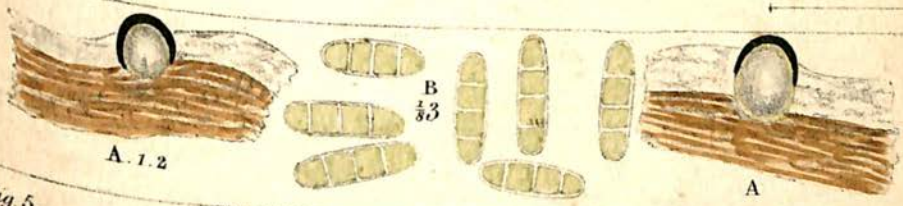
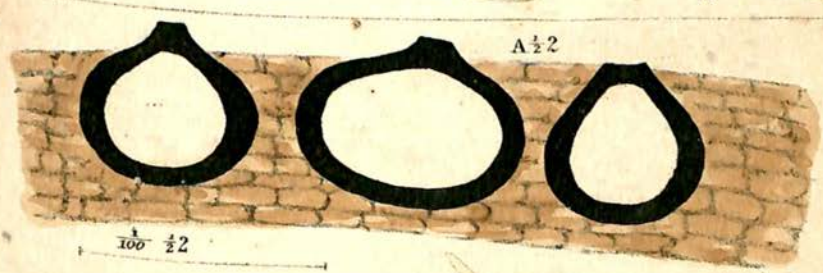
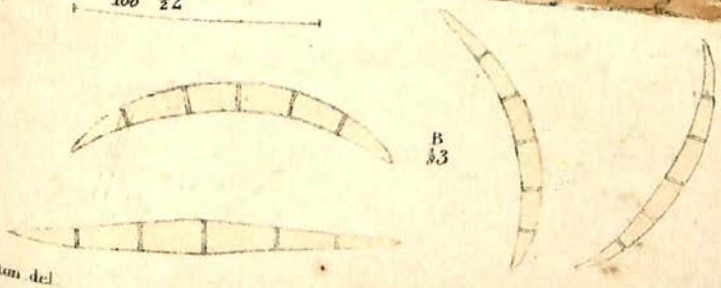


Fig. 5.





Del. W.A. Leighton del

Lenz Aldous, lith

Fig 1 VERRUCARIA RHYPONTA . ACH
" 2 " BIFORMIS . E BOT SUPPL
" 3 " BYSSACEA . TAYL
" 4 " (VERA) SCHÆR
" 5 " VAR SUBFUSCA . SCHLEICHER

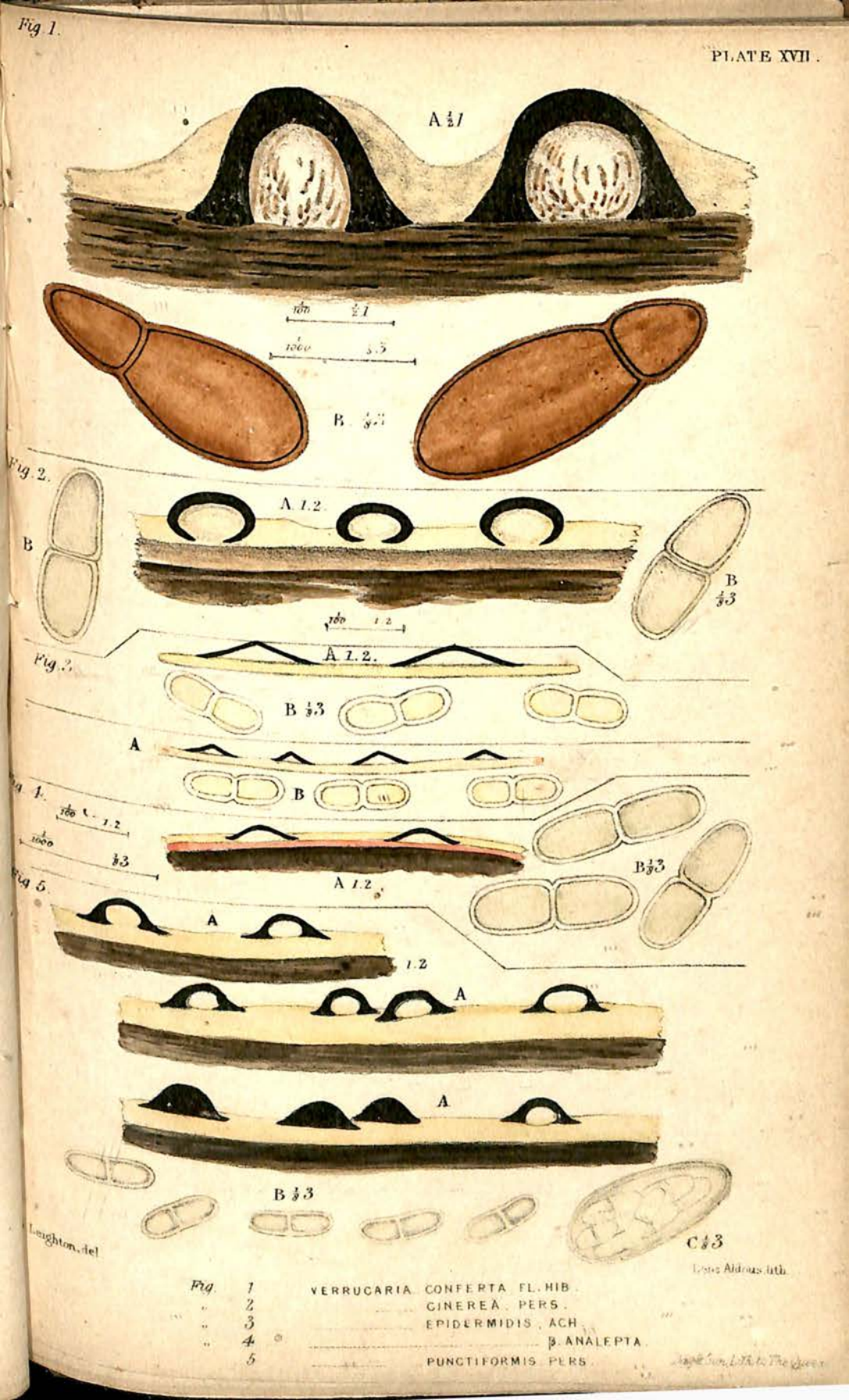


Fig. 1 VERRUCARIA CONFERTA FL. HIB.
" 2 ..... CINEREA. PERS.
" 3 ..... EPIDERMIDIS. ACH.
" 4 ..... β. ANALEPTA.
" 5 ..... PUNCTIFORMIS. PERS.

Fig 1

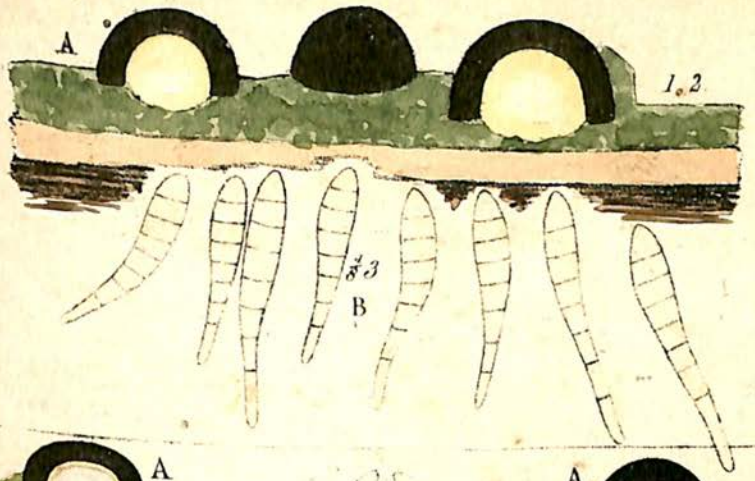


Fig. 2

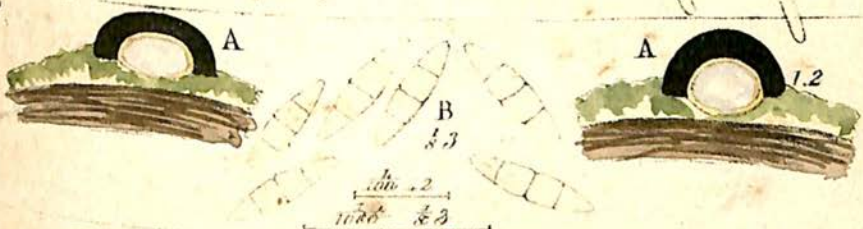


Fig. 3

Fig. 4.

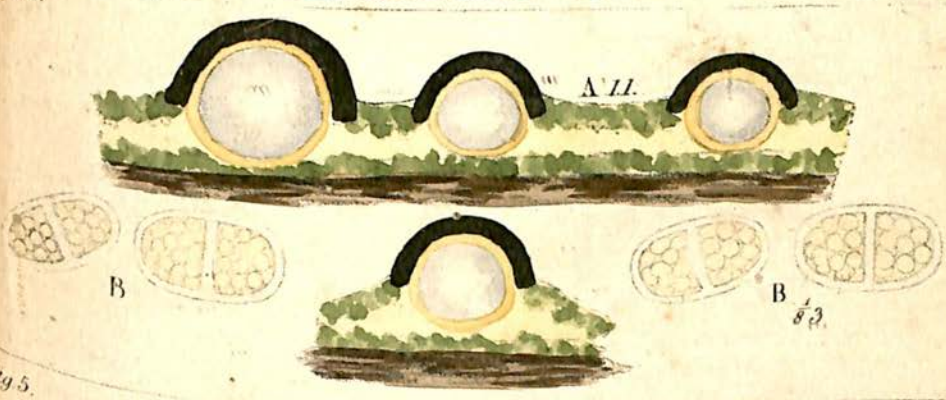
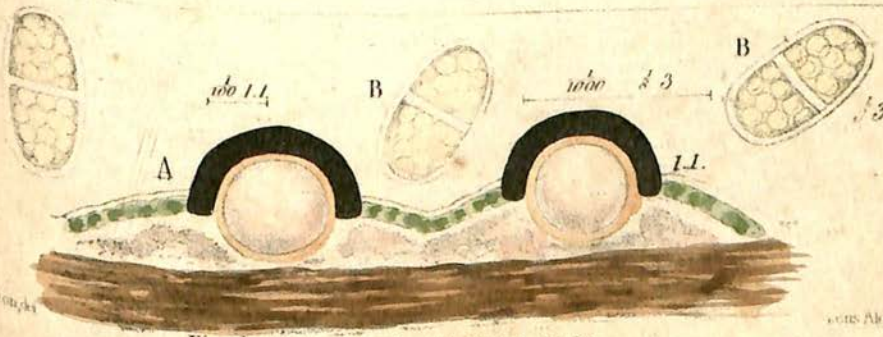


Fig 5.



A. Leighton sculp.

Lens Ablett, lith.

Fig. 1 VERRUCARIA OLIVACEA, PERS
2 FUSIFORMIS
3 EYELII
4 GEMMATA, ACH
5 ALBA.

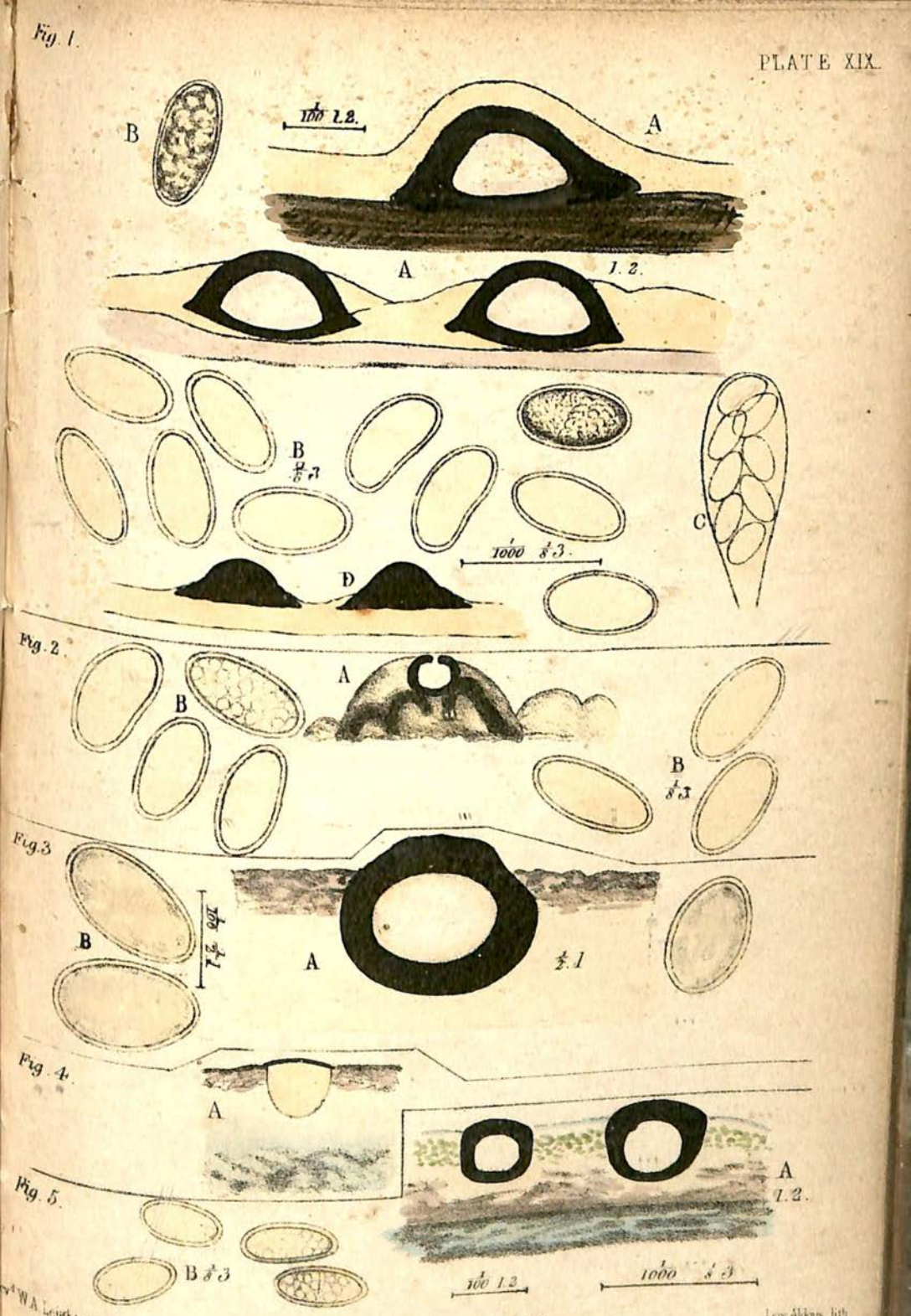
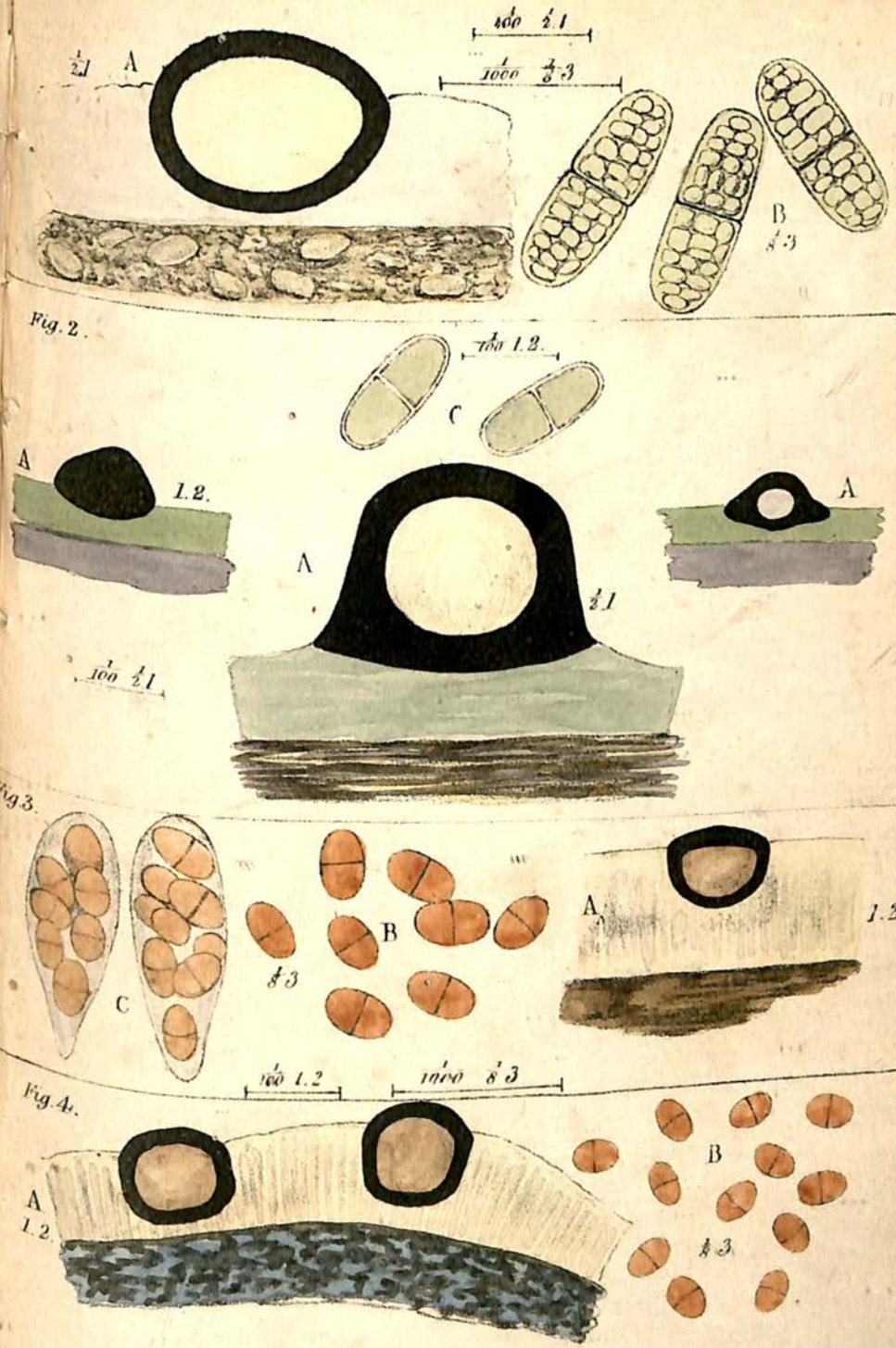


Fig. 1. VERRUCARIA LÆVATA, ACH.
— 2. ———
— 3. ——— MURINA.
— 4. ——— HARRIMANII, ACH
— 5. ——— PLUMBEA, ACH

del. W.A. Leighton
Lens Ablett lith

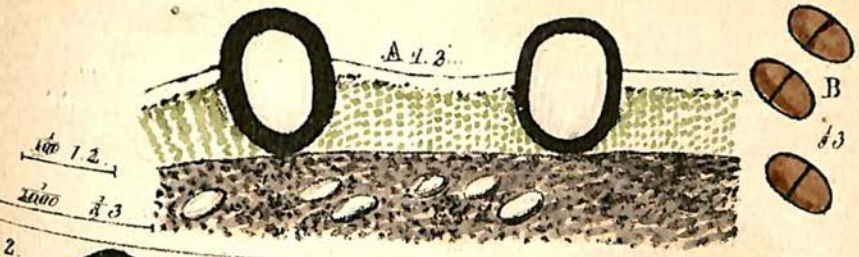


W. A. Leighton, del.

Lemuel Aickman, Sculp.

Fig. 1. VERRUCARIA MURALIS, ACH.
Fig. 2. ——— LITORALIS, TAYL. M.S.
Fig. 3. ——— GEMMIFERA, TAYL.
Fig. 4. ———

Fig. 1.



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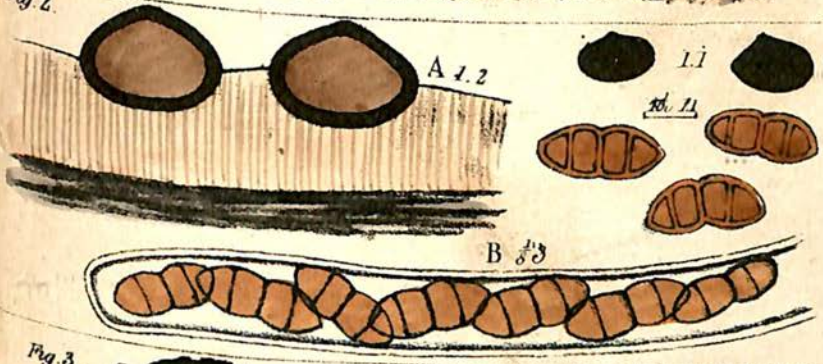

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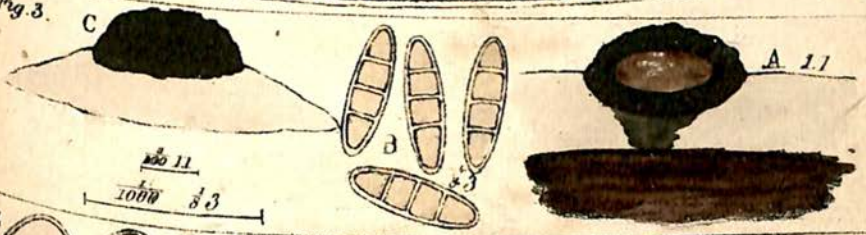

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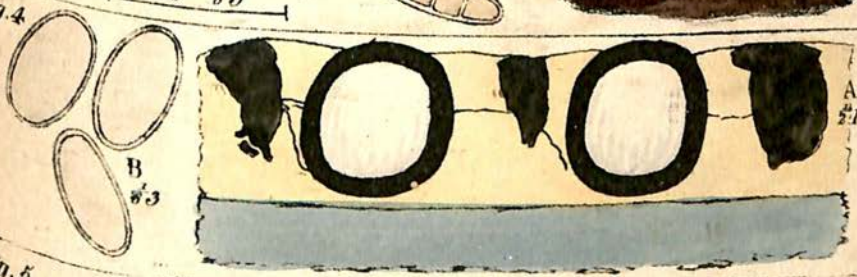

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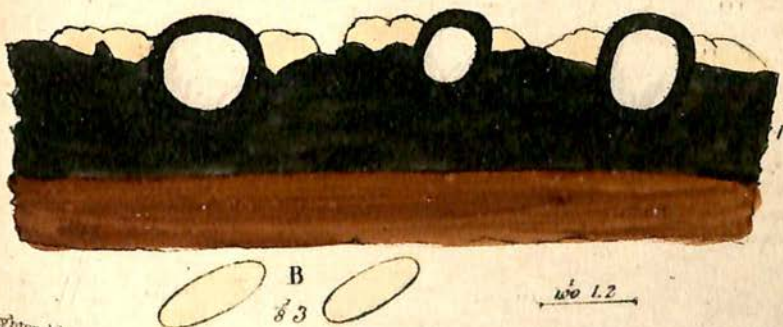


Hanc^d W.H. Leighton del.

Lens Abbott, lith

Fig. 1. VERRUCARIA RUGULOSA, BORR.
2. ——— PERIPHERICA, TAYL.
3. ——— UMBROSA, TAYL.
4. ——— MACROSTOMA, D. C.
5. ——— POLYSTICTA, BORR.

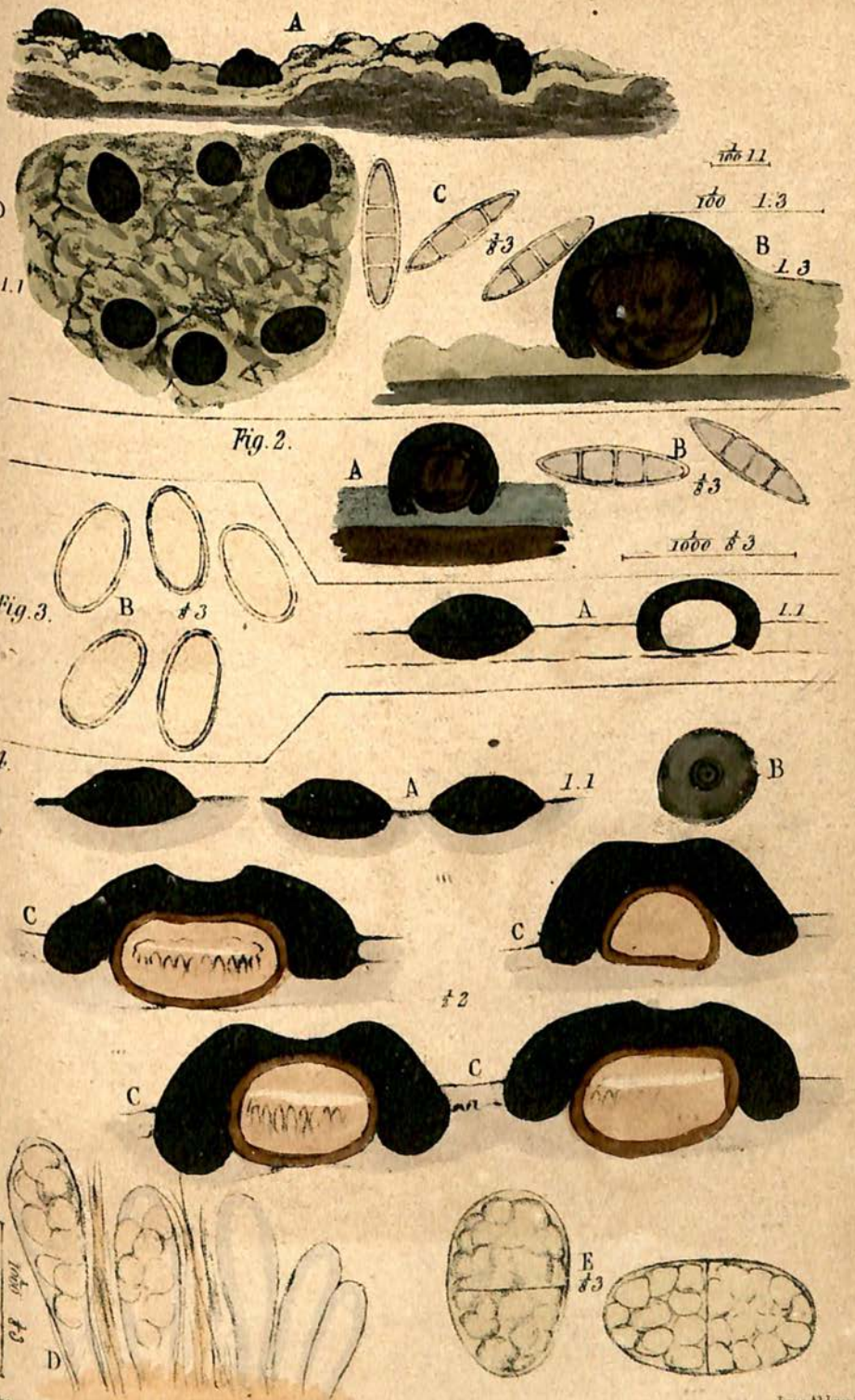
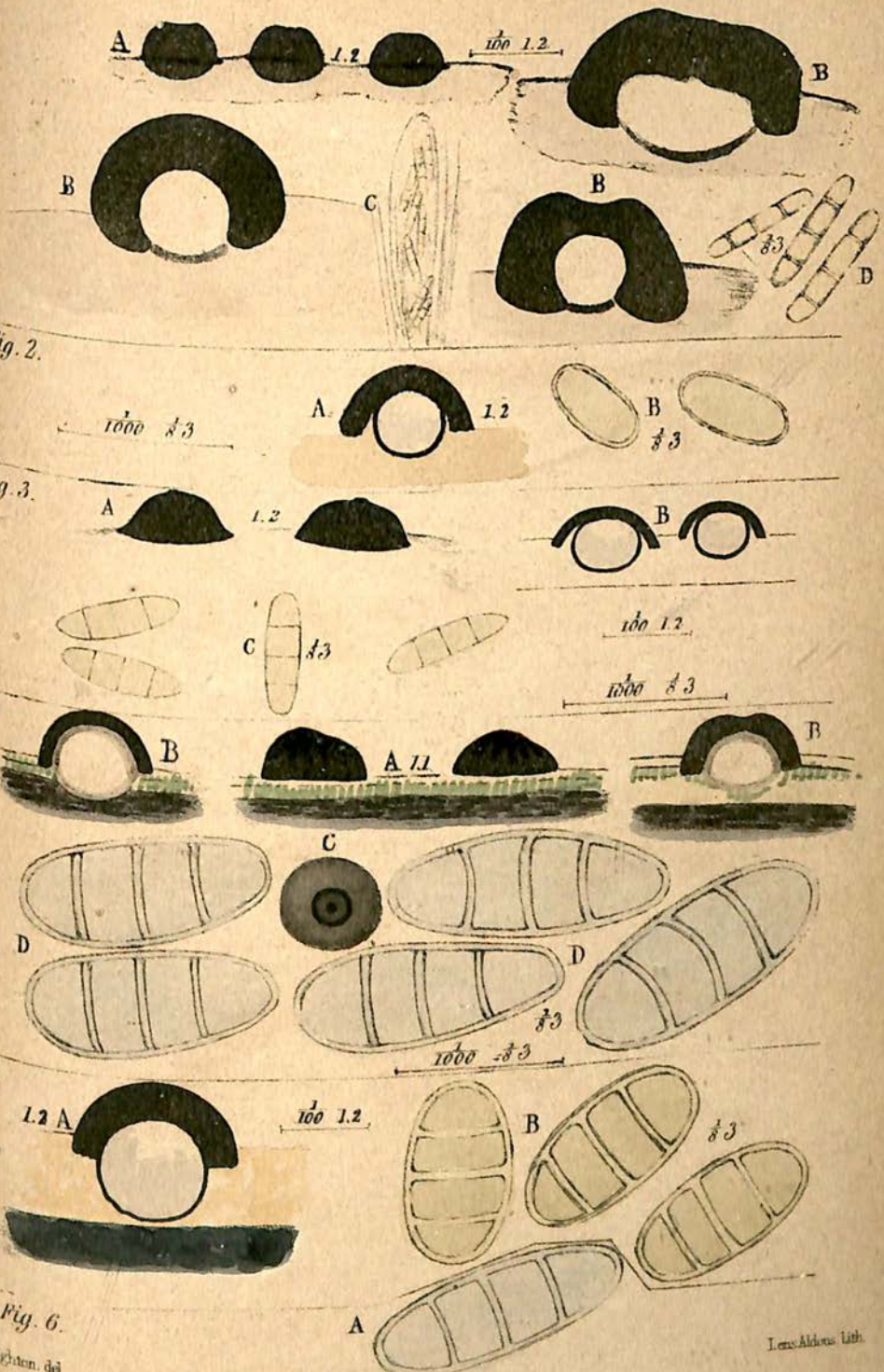


Fig. 1. VERRUCARIA TRACHONA. TAYL.
2. ——— VAR.
3. ——— CONCINNA, BORR.
4. ——— DUFOURII, D C.

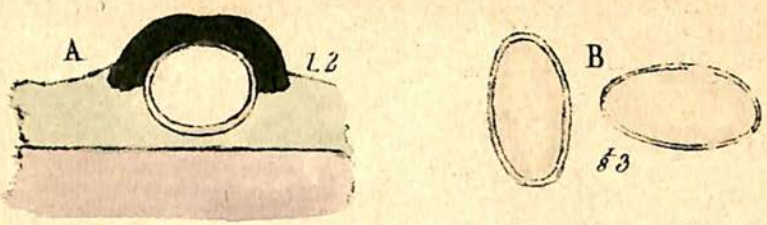


W. A. Leighton. del

Lens Aldous Lith.

Fig. 1. VERRUCARIA LINEARIS.
2. UMBRINA, ACH.
3. CODONOIDEA.
4. SPRUCEI, CH BAB
5.
6.

Fig. 1.



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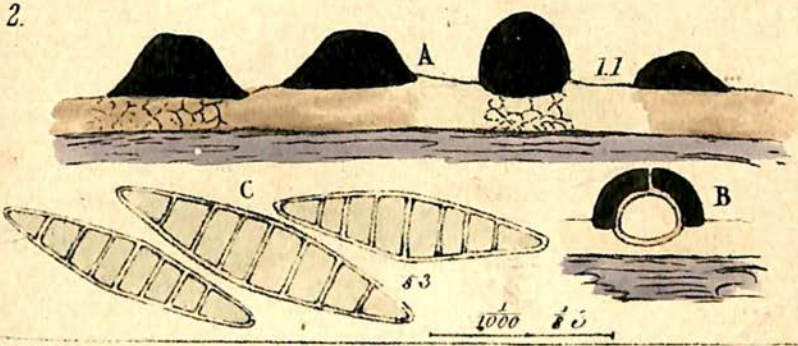

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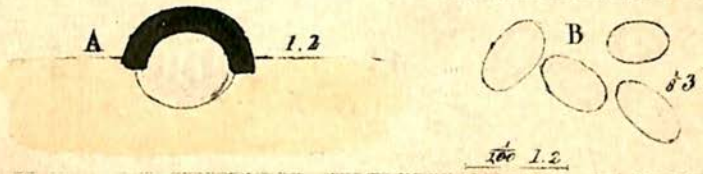


Fig. 4.

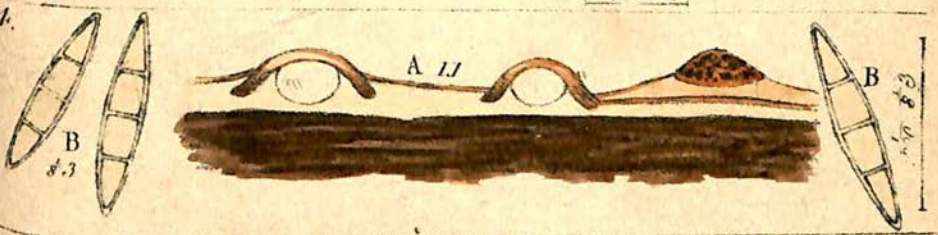
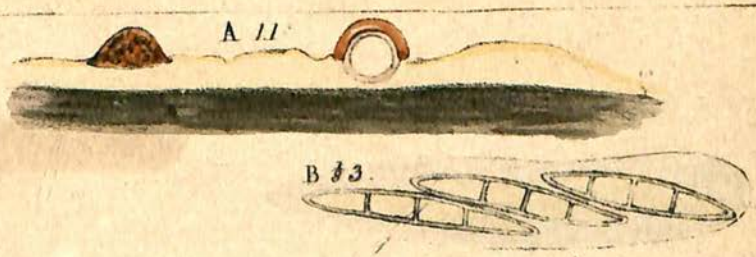


Fig. 5.

Fig. 6.

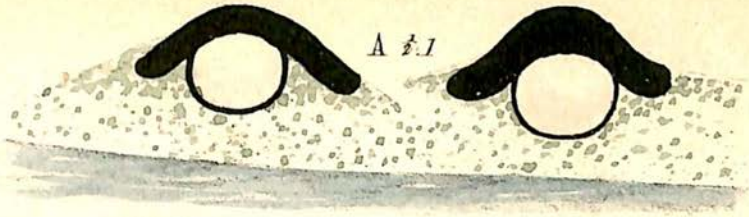


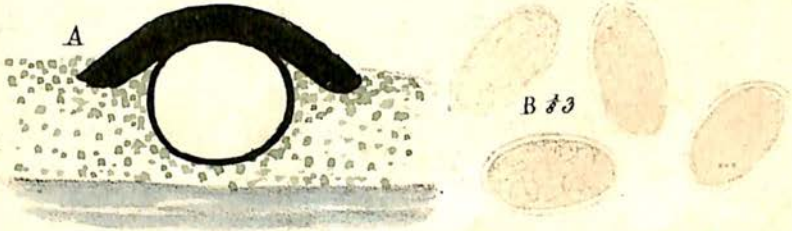
W.A. Leighton del.

Geins. Aldous. lith.

Fig. 1. VERRUCARIA PAPILLOSA, ACH.
2. ——— LUCENS, TAYL.
3. ——— MUTABILIS, BORR.
4. ——— IRRIGUA, TAYL.
5. LICHEN IMMERSUS, E. BOT.
6. VERRUCARIA ERYSIBODA TAYL.

Fig. 1.





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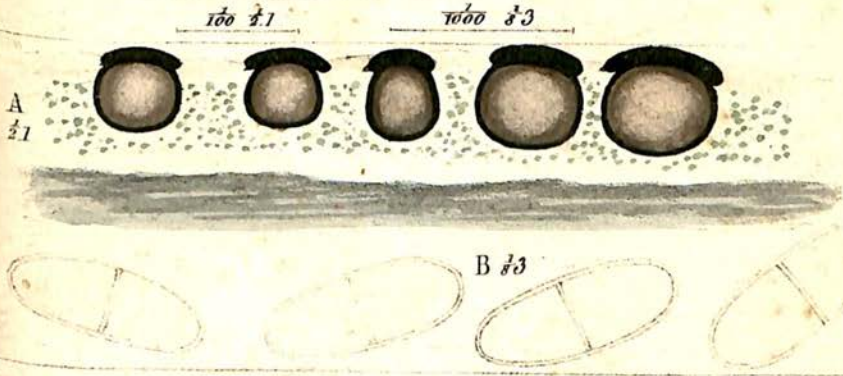

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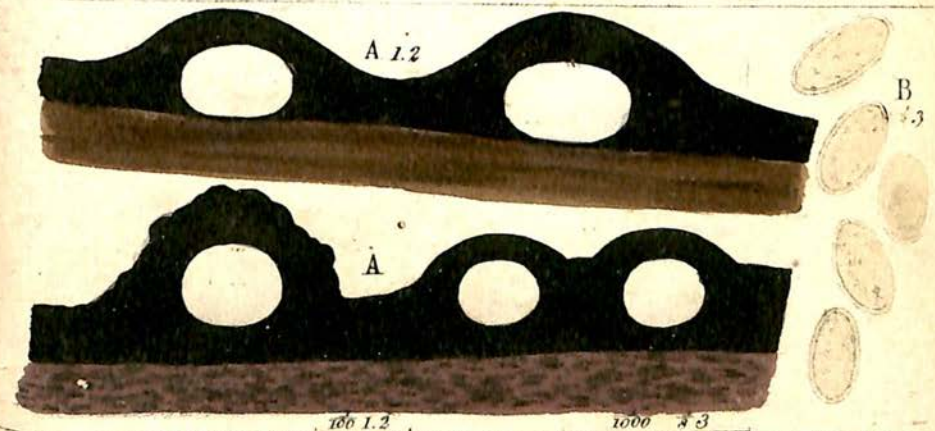


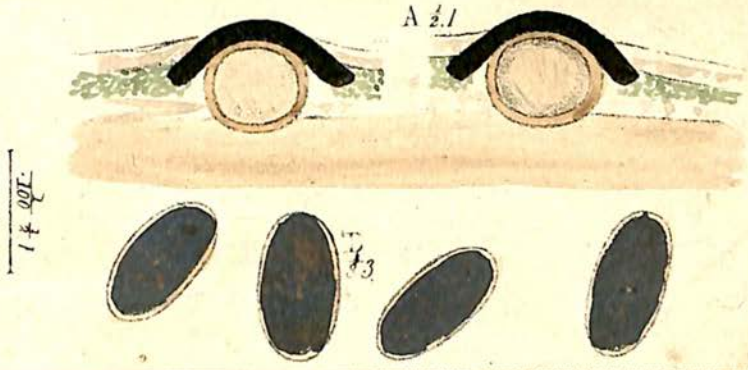
4.

W. A. Leighton, del.

Lens Aldous, lith.

Fig. 1. VERRUCARIA SUBALBICANS.
2. ——— IMMERSA, HOFFM
3. ——— MAURA, ACH.
4. ——— RUPESTRIS, SCHRAD.

Fig. 1.



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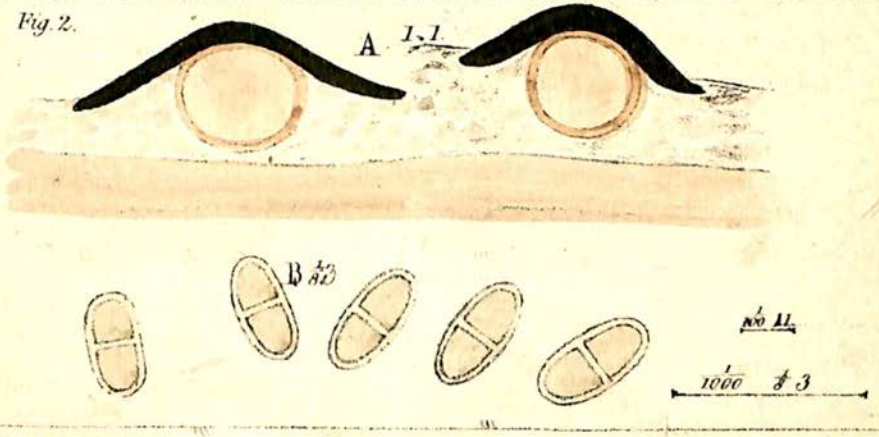
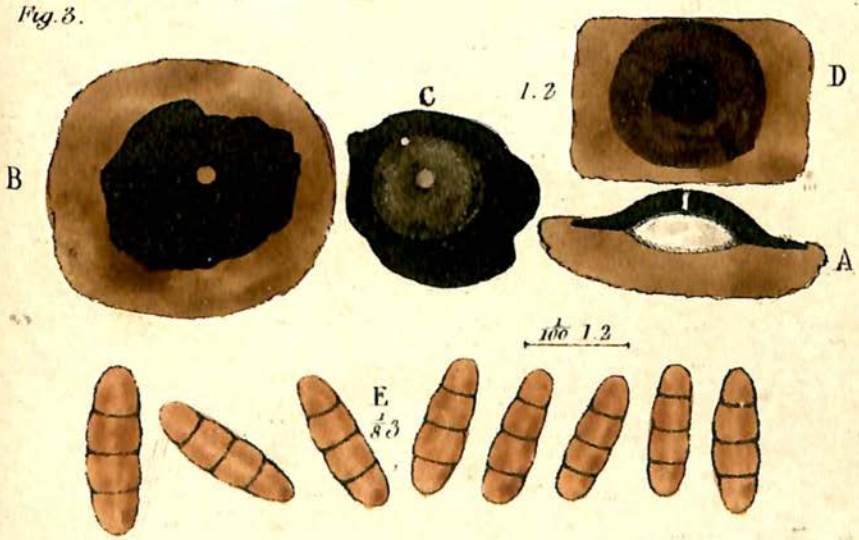


Fig. 3.



Leighton, del.

Lens Aldous, lith.

Fig. 1. VERRUCARIA PATULA
— 2. ——— EPIPOLÆA, ACH.
— 3. ——— MARGACEA, WAHL.

Fig. 1.

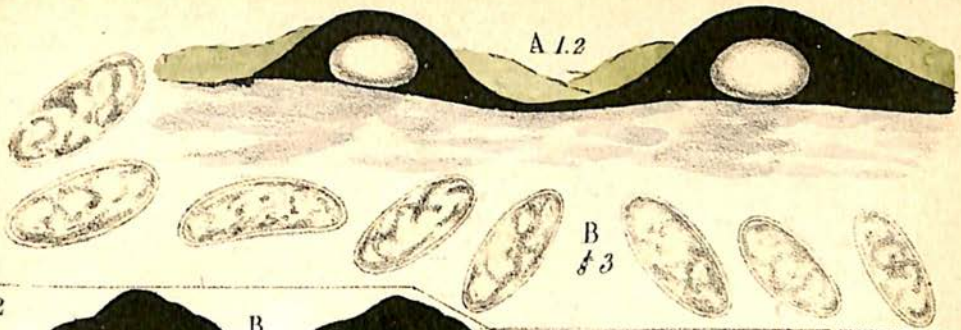


Fig. 2

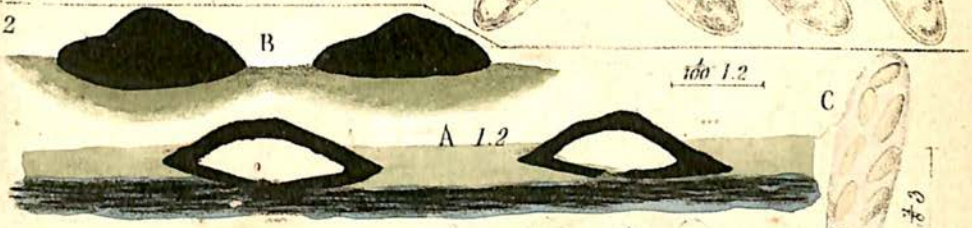


Fig. 3

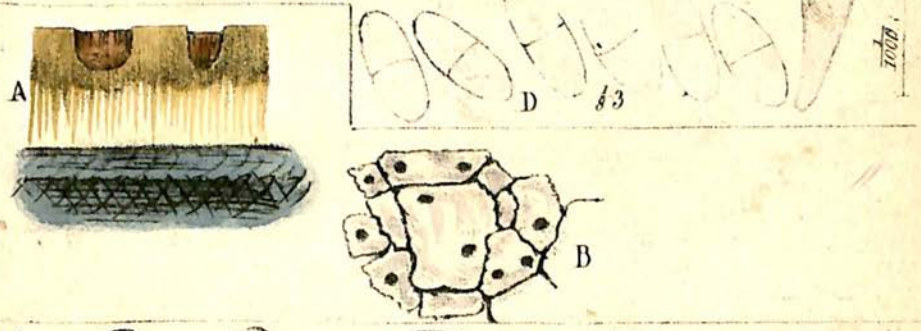
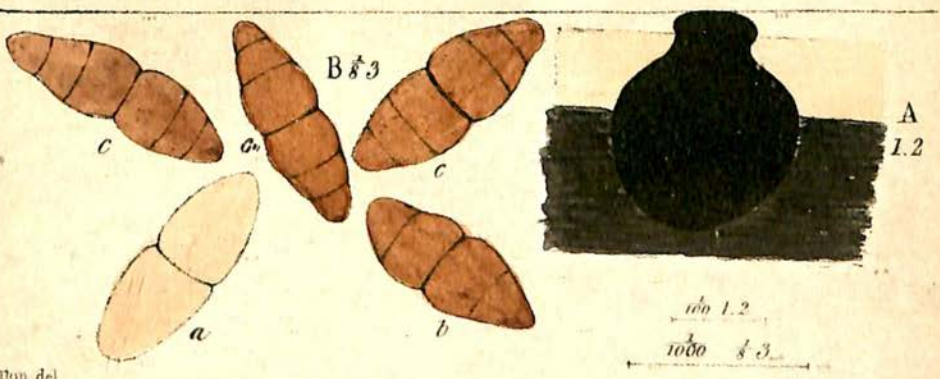


Fig. 4

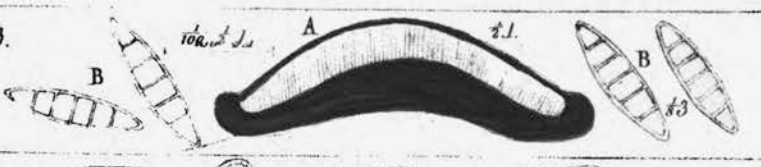
Fig. 5.

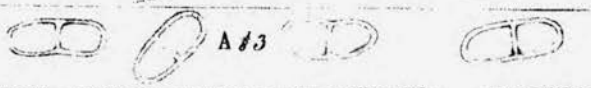


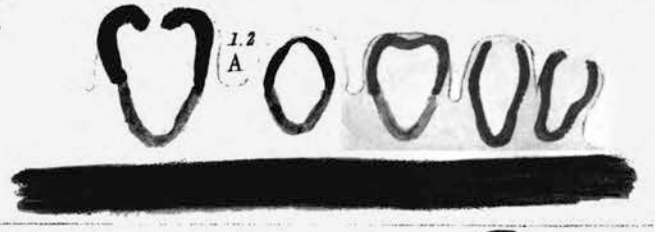
A. Leighton. del

Lens Aldous Lith.

Fig. 1. VERRUCARIA NIGRESCENS, PERS.
2. ——— ELÆINA, BORR.
3. ——— GAGEI, BORR.
4 ——— EPIGÆA, ACH.
5 ——— HOOKERI, BORR.





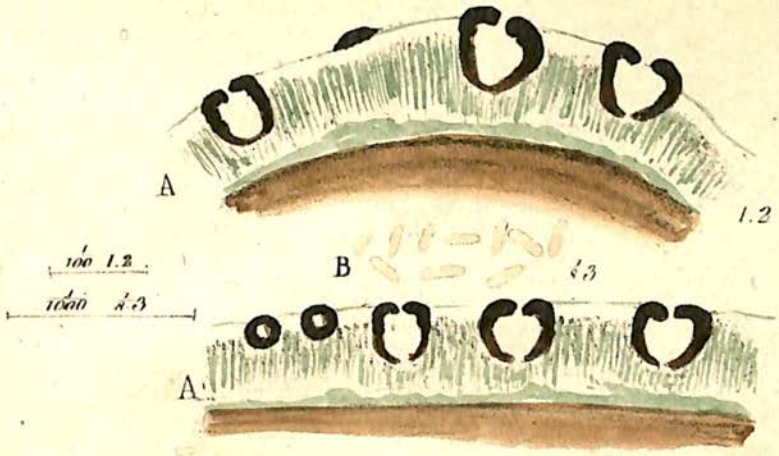


Revd. W. A. Leighton, del.

Fig 1. PYRENOTHEA LEUCOCEPHALA. FRIES.
— 2. PATELLULÆ ON P. LEUCOCEPHALA.
— 3. LECIDEA ARIETINA, BOHL. L. B.
— 4. LICHEN GRIFFITHII, E. BOT.
— 5. PYRENOTHEA RUDIS.
— 6. ——————— PSEUDO LEUCOCEPHALA,
— 7. ——— APHANES.

Lens Aldous, lith.

Fig. 1.



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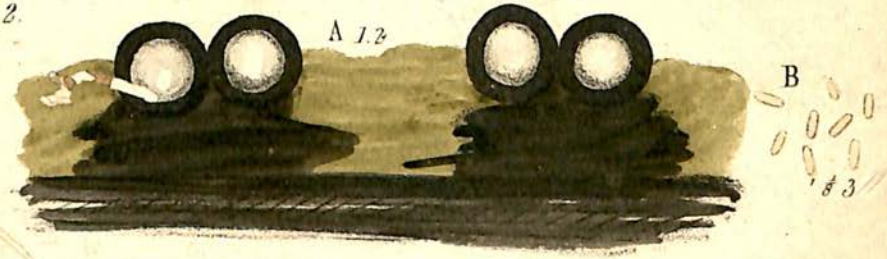
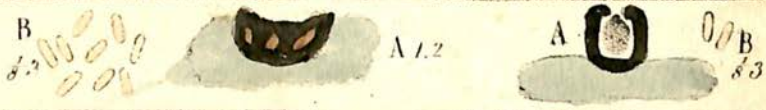


Fig. 3.



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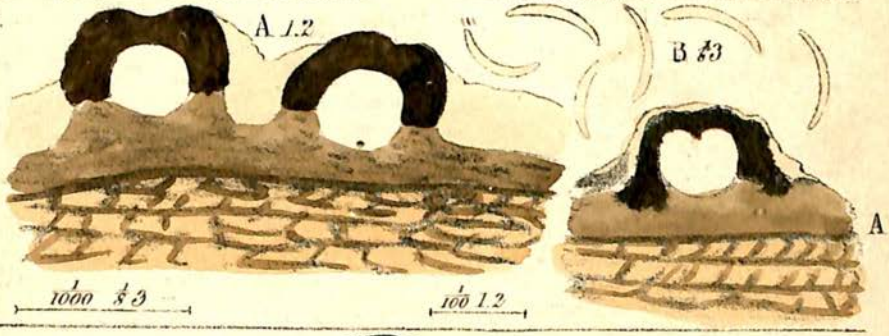

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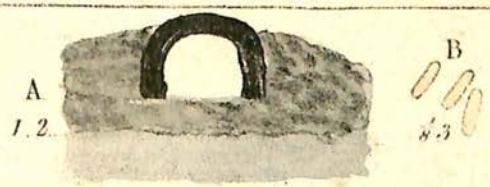


Lanis Mideus lith.

Fig. 1. PYRENOTHEA NIVEO-ATRA.
2. MOLLIS.
3. LITHINA.
4. LUTEA.
5. SULPHUREA

Fig. 1.

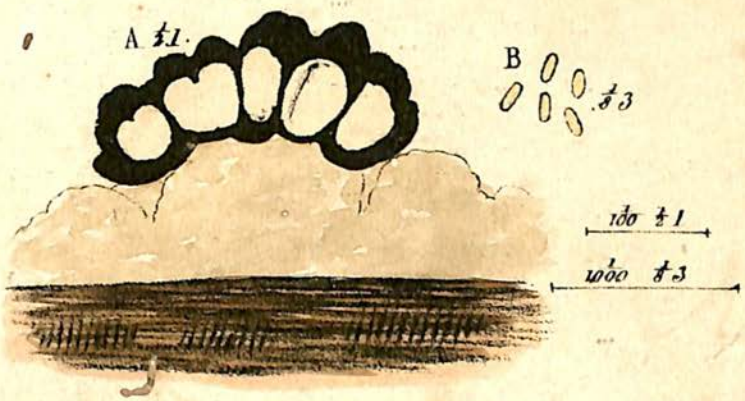


Fig. 2.

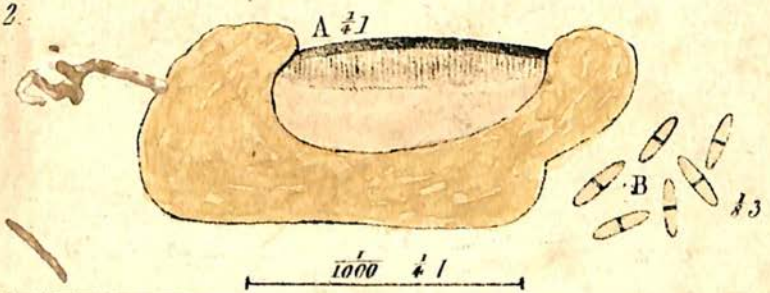
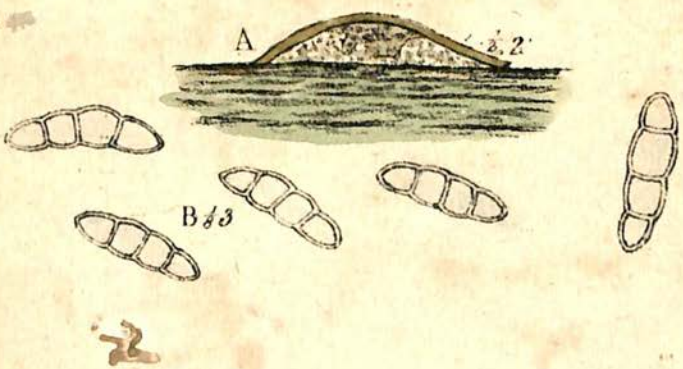


Fig. 3.

Fig. 4.



W. A. Leighton, del.

Lemuel Aldrich, lith.

Fig 1. CLIOSTOMUM CORRUGATUM, FRIES.
2. LECIDEA EHRHARTIANA.
3. PARMELIA (LECANORA) VARIA.
4 STRIGULA BABINGTONII, BERK.

00088279

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